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ABSTRACT

This document consists of one volume year (four quarterly issues) of the journal "HyperNexus", containing articles on hypermedia and multimedia use in education. Typical article topics are: obstacles to the widespread use of educational technology; software for Japanese language learning; information retention using interactive videodisc; hypertext/hypermedia instructional design considerations; a guide to virtual reality; hypercard in the foreign language classroom; guidelines for using icons; reasons for using virtual reality; hypermedia on the information superhighway; developing a kiosk, or multimedia database; and teaching educators about virtual reality. Columns include editorials, hardware and software updates, book reviews, conference announcements, and learning activities. (AEF)

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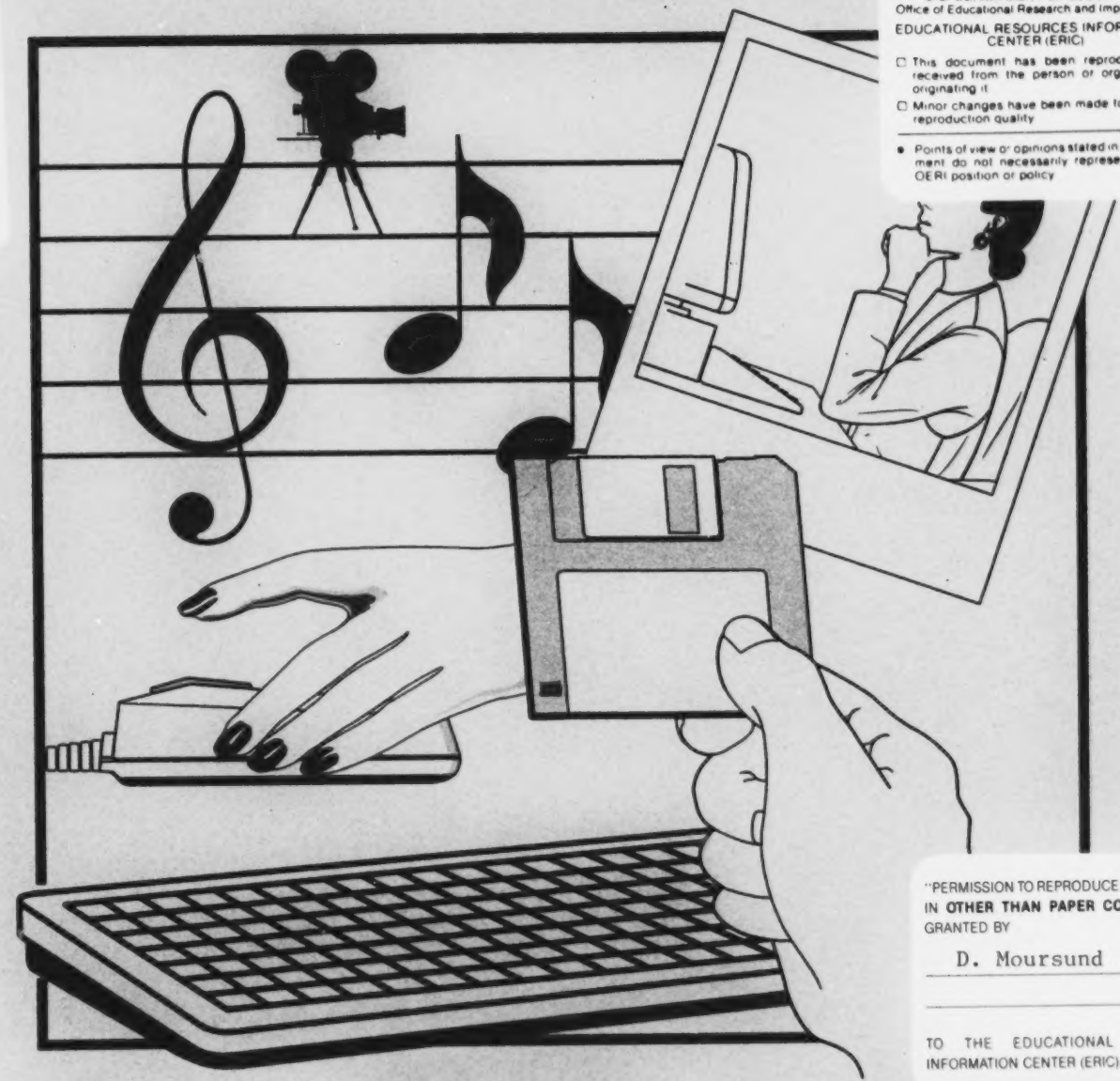

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THIS ISSUE:

C.A.L.L. SOFTWARE FOR JAPANESE LANGUAGE LEARNING
INFORMATION RETENTION USING INTERACTIVE VIDEODISC 2

HyperNEXUS Volume 4 Number 1

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Sharing

As *HyperNEXUS* matures, it's important to keep in touch with our readership. Who are you? What do you do? What are your needs and interests? We need to hear from you. A survey has been included with this issue. Feel free to photocopy the survey and have everyone in your department complete one. If you've been feeling guilty about not submitting an article, you can at least return the survey and let me know you're alive and working. Send it by fax, E-mail, express mail, or snail mail. Just return it. I couldn't attach a bookmark, lollipop, or dollar bill as an incentive. I didn't even include return postage, but I'm appealing to your sense of duty as a HyperSIG member and multimedia user. Do you feel guilty yet? Oh well, at least I tried.

I'll post the results in the Spring issue, so please return the survey as soon as possible. Even if you bury this issue and don't get to the survey for 6 months, your input will still be helpful!

I'm hoping we're finally back on track with the Winter issue. My pleas are slowly being answered and we actually have a few articles in the hopper for next Winter already.

In This Issue

This issue begins with a short hardware and software update. We're interested in publishing information about all the new resources you're using. Even if they are a couple years old, consider sending me a note.

This issue contains four features articles. The lead article by Leslie Cummings deals with issues regarding technology and change for learning.

Our second article by Yuko Kuwai and David McMullen focuses on computer assisted language learning (CALL) and is titled "Developing Effective Japanese CALL Courseware Using *HyperCard*."

Richard Castelluccio provides insight into the attitude and retention effects of graphic organizers during an interactive videodisc lesson in our third article.

Finally, our final feature article titled, "Instructional Design Considerations in Developing Hypertext/Hypermedia in Instruction," is by Yusup bin Hashim and Razmah bt. Man.

Our *HyperNEXUS* survey, the HyperExchange column, and the Cheat Sheet column round out this issue. The Cheat Sheet comes from a new book co-authored by Ann Barron. The topic is *HyperCard*.

In Conclusion

I'm looking forward to receiving your survey. While you're at it, why not include a short article? Forward it to me at the address below:

***Annette Lamb**, The University of Toledo, 2801 W. Bancroft, Toledo, Ohio 43606; E-mail: fac2327@uoft01.bitnet or alamb@uoft02.utoledo.edu.*

Hardware and Software Update

New Book

New Technologies for Education: A Beginner's Guide is a new book by Ann Barron and Gary Orwig. Designed for all educators who are interested in bridging the technology gap and improving the instructional process through appropriate use of new technologies.

For more information, contact Libraries Unlimited, 800/237-6124; or use the ISTE order form on Page 28.

QuickTime Update

Over 1 million copies of Apple Computer, Inc. *QuickTime* have been shipped. More than 300 *QuickTime* applications have been developed so far. *QuickTime* for Mac and *QuickTime* for *Windows* have both won 1993 Software Publishers Association's Codie awards for excellence. The most recent versions are *QuickTime 1.1 for Windows* and *QuickTime 1.6* for the Mac. Users of *QuickTime 1.5* will be happy to hear that *QuickTime 1.6* requires almost 90 percent less memory than *QuickTime 1.5* when installed.

New Journal

The **QuickTime Forum** is a multimedia developer's resource. It is the official journal of the Apple Multimedia Program. It deals with issues facing developers including educational, business, marketing, legal, and technical issues.

For more information, contact The QuickTime Forum, MultiFacet Communications, Inc., PO Box 70758, Sunnyvale, CA 94086, 408/749-0549. A one year, six-issue subscription costs $99.

Technology for Learning: Resisting Change

Leslie E. Cummings

Introduction

Lip service constantly is given the notion that improvement in American education and training is the most important issue in determining whether the United States will be a viable global force in the 1990s and beyond. But the bottom line can be summarized in the words of a familiar headline referring to former President Bush's performance as "the education president"; "Education: All Talk and No Action." Many believe that a more meaningful, attuned, and stimulating learning experience is mandatory to improve education and training, and that educational technology can make a substantial contribution in providing that experience. This article discusses a set of obstacles deemed to be frustrating the widespread adoption of such technologies, and suggests routes to overcome these obstructions.

Sally Bowman, director of a California non-profit corporation called the Computer Learning Foundation, is among those who advocate a more interactive, experience-based learning environment; and one which intermingles subjects, rather than separating them into discrete units. Educational technology emerges as the ideal collection of tools to empower instructors and to immerse students in such an approach to education (O'Malley, 1991, p. 14). For this effort, experts suggest the adoption and integration of a variety of educational technologies, including but not limited to: interactive laserdisc, CD-ROM, and emerging media (e.g., Compact Disc-Interactive; Digital Video Interactive); educational television programming (via satellite, cable, direct programming, and tape); and distance (remote) education (Kinnaman, 1992; Moore et al., 1992, pp. 74-76; Van Horn, 1991).

What's Stopping Us?

Numerous issues and challenges appear to slow the embrace of these technologies and opportunities. Resistance deriving from relatively cerebral and personal issues is the focus of this article. However, other very significant adoption barriers inhibit the uptake and implementation of these technologies including funding shortfalls; lack of systems, access, training, and support; inadequate standardization of systems; and especially, an absence of administrative awareness, commitment, and leadership (Brooks, 1991, pp. 25-26). Institutionally-rooted traditions such as brief class intervals and rigid arrangements for classroom and laboratory seating also can hinder an inclination toward, or advantage in using, educational technologies (Arnold, 1991). And in certain higher education disciplines, a pronounced bias for research productivity over teaching can discourage the commitment of time necessary to update one's teaching approach via these systems (Sykes, 1988, Chapter 4).

Internalized grounds for shunning new technologies range from fear to functional concerns, from pragmatism to pertinacity, and from lack of awareness to lack of initiative. Here, the investigative focus is the subtle but serious collection of issues underlying resistance by individual teachers and faculty members in their roles as educators. Three forces believed to form much of the foundation of such barriers are discussed below; 1) historical reference and experience, 2) lack of pedagogical preparation, and 3) the "classroom capture" paradigm.

Historical Reference and Experience

Exposure, familiarity, and belief are strong tethers tying many educators to the nearly sacrosanct sage-to-vessel teaching approach. The majority of today's educators did not experience the effective use of multimedia or hypermedia during their own years as students. Their exposure, typically, was to the centuries-old convention of being lectured to, memorizing and drilling on assigned materials, and passively reading, viewing, and listening to linear course media (see below). Even today, fewer than half the nation's teachers have had as much as ten hours of training on even the basics of personal computers, much less multimedia systems (O'Malley, 1991, pp. 13-14).

Perpetuating their own experience, teachers tend to relay lists of facts and discrete skills to students, rather than coaching thinking skills, a love of learning, etc. In this approach, when computers *are* used, they are applied as mere replacements for rote skill-building, or as little more than automated page-turners; or word, data, and image processors. Most teachers appear secure and comfortable with this approach, and perceive neither urging nor advantage to change. Furthermore, most have little notion of a worthy alternative to which to change.

Pedagogical Darkness

A significant reason that instructors avoid the adoption of educational systems might be attributed to a lack of appreciation of the technologies' pedagogical prowess. Among the pedagogical advantages of multimedia-hypermedia technologies is their ability to provide one-on-one attention and feedback, and on-demand, customized tutoring that is independent of the need for classroom and instructor's time. This is the dedicated task of technological tools, unlike the situation of today's often overwhelmed instructor. Courseware typically brings to users plural representation of information to enhance understanding (text, graphics, video, audio), and facilitates the same variety in potential expressive outputs. Students and faculty alike benefit. These tools are confirmed to be superior to conventional approaches in effecting learning, and to be more appealing, dynamic, resource-rich, and engaging (*The Computer*, 1990/91, p. 7).

While their pedagogical strength would be expected to be among the most compelling reasons to adopt educational technologies, since many instructors lack an appreciation of pedagogical issues, this advantage probably inspires minimal attraction. A painful irony is that, especially in higher education (although generally highly regarded subject specialists), instructors/faculty rarely have preparation *as educators*. Most lack more than a superficial understanding of formal pedagogical issues such as how adults learn, effective communication skills, and alternative educational approaches. Even higher education institutions dedicated to K-12 teacher preparation shun such topics. Goodlad et al., surveyed the teacher preparation colleges of 29 public and private higher education institutions, reporting; "We did not find a single mission statement of any institution that put teacher [pedagogical] education at the forefront" (1990). Instead, even the very colleges that allegedly are building a pedagogically literate professorate choose to stress subjects like testing

and measurement, school finance, and how to use computers for drill and practice.

Challenging the Classroom-Capture Paradigm

To change education using computers is to change what teachers conceive of as their primary purpose (O'Malley, 1991, p. 14). In this vein, a strong deterrent to a more sweeping adoption of educational technology can be presumed to be the tradition of the classroom professor-pupil relationship. In the educational delivery paradigm of the last two centuries, students are expected to gather before an instructor in an enclosed room. Often, instructors rule the setting as virtually omnipotent dispensers of knowledge. Meanwhile, students easily can be disengaged completely from what is transpiring around them.

The classroom-capture model, in which students are seldom participative, has proven to be an ineffective way to bring about learning. It is an ineffectual use both of class time and of computers in many cases. Studies show that in conventional classrooms today, students spend three-fourths of their time passively expected to listen. On average, it is estimated that instructors terminate attention to a topic at a point when 30-50 percent of a class understands 80 percent of what they were intended to know to master given subjects (Kelly, 1990, p. 62). Seymour Papert, the developer of the Logo computer language for children, believes that the current American educational system "infantilizes" students by failing to give them real responsibilities in learning.

Related to the time honored role of teacher as all-knowing, the functional design of computer-based media is another factor that could hinder its adoption. For example, *non-linear* presentation or lab products (e.g., hypermedia) allows users to navigate individual and autonomous routes by branching and linking from idea to idea, and from topic to topic. This freedom is in contrast to traditional media like books, films, and even lectures that present a linear path from beginning to end. Educators may be put off by a sense of loss of control in the what, when, and summary point of view expressed when students are in the drivers seat (Arnold, 1991; Bradsher, 1990, p. 313; Brim, 1991, p. 49).

No Pain, No Change

Change, classically, is arduous to achieve. The very roles of students, educators, and media must undergo a metamorphosis in order to achieve the sought after improvements for students in learning and preparation for life, society, and the workplace. With the incorporation of advanced technologies in education, faculty will be freed to be coaches, commentators, curriculum strategists; to point out alternative discovery paths, rather than simply to inform, test recall, and maintain peace. Students must be inspired to explore, stretch, question, and think; to take on responsibility for their educational and learning progress. In this relationship, faculty can serve as "knowledge navigators" says Apple's CEO John Sculley. They will be facilitators and mentors, much as Socrates evoked learning, stimulating and challenging students to grapple with questions and issues. For faculty, the footing in this proposed role, as contrasted with today's class capture role, probably seems as inviting and secure as trekking through a dark, uncharted, and very deep swamp.

Overcoming Resistance to Achieve Change

To move forward, instructors must cross not only the enormous barriers surrounding tradition, the familiar, and the status quo, but they then must surmount still more barriers that envelope the "changes" themselves. To overcome resistance and ignite change will require commitment, prompting, and resources. Technology is not and will not be embraced without these elements: research has shown that most faculty tend to be adapters, not adopters" in areas relating to technology (Marcus et al., 1991, p. 78).

Experts with the U.S. Office of Technology Assessment, and with the National Education Association, among others, recommend that the FIRST steps in merging technology and education involve awareness and incentives. Educators are unlikely to loosen their ties to their past, and to change their teaching modes more than marginally, until they are motivated to change; specifically, until they see that it will solve an immediate problem. Educators also must be aided in becoming knowledgeable about the technologies to which they are migrating, including developing hands-on familiarity and comfort with multimedia systems, networks, and related technologies. Finally, the resistance will persist until instructors are sufficiently convinced about the functionality of educational technology, including its ease of use and reliability.

Incentives and intervention are mandatory to move educators to give up the familiar, and to move forward to what now may appear as a foreign educational environment. Without such action, faculty will tend to perpetuate traditional methods and practices in teaching, further postponing the integration of educational innovations (Hefzallah, 1990, p. 213; Marcus et al, 1991, p. 78; Thornburg, 1991). Initiatives for change must come both from pioneering instructors, and from those leaders who are sufficiently enlightened and secure to insist upon and support educational technologies in the curriculum.

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ISTE PRESENTS

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Developing Effective Japanese CALL Courseware Using HyperCard

Yuko Kuwai and
David W. McMullen

Introduction

Ideally, instruction in the Japanese language for American learners should be team taught by teachers who teach the linguistic aspect of the Japanese language and by teachers who teach the actual use of the Japanese language. Teachers who teach the linguistic aspects of the Japanese language are ideally native speakers of English who are specialized in linguistics, and who provide students with lectures about the grammar and the cultural background behind the Japanese language. Teachers who teach the actual use of the Japanese language are ideally native speakers of Japanese who are trained to teach Japanese as a foreign language, and conduct drill sessions in which students actually practice speaking the Japanese language. However, not all Japanese programs in the United States are able to offer Japanese language instruction with this ideal situation.

When only teachers who teach the linguistic aspects of the Japanese language are available in Japanese language instruction, students only learn *about* the Japanese language. Since for most of the students, the purpose of learning Japanese is to acquire oral proficiency, in other words, communicative skills in the Japanese language, this Japanese language instruction does not meet the students' purpose of learning.

When only teachers who teach the actual use of the Japanese language are available in instruction, students are required to study the linguistic aspects of Japanese language with the textbook by themselves. Since classroom activities are conducted with the assumption that students fully understand linguistic aspects of the Japanese language explained in the textbook, students who do not understand explanations in the textbook are not able to follow classroom activities. Except for quizzes or examinations, there is no way for teachers to measure how well students understand the content of the textbook. Even though teachers may find particular problems of students, especially in the areas of grammatical structures which are particular in the Japanese language, there are no remedial materials to supplement these problems. Therefore, both teachers and students may feel frustration for not having opportunities to discuss problems in learning the linguistic aspect of the Japanese language.

Computer-assisted language learning (CALL) is an effective educational aid for Japanese language instruction in which only teachers who teach the actual use of the language are available, and no lectures on linguistic aspects of Japanese language are given. With CALL courseware, teachers can provide students with supplemental materials which enhance students' understanding of the linguistic aspects of the Japanese language, especially grammatical structures in the Japanese language.

Using *HyperCard*, teachers can make CALL courseware that is directly connected to a particular lesson in the textbook, and have students work with the tutorial to master the linguistic aspects of the Japanese language covered in lessons in the textbook. Teachers are able to assess each student's understanding of the linguistic aspects of Japanese language, and are able to provide students with proper advice as to whether students need extra work for the current lessons or not.

Both students and teachers benefit from CALL. Since courseware is tailored to the sequencing of the textbook, students can see how doing these exercises will help them to follow classroom activities. Teachers are able to assess student understanding of the textbook and provide students with appropriate instruction, even though teachers do not directly give lectures on the linguistic aspects of the Japanese language explained in the textbook during classroom activities.

In addition to using the courseware to supplement or improve exercises appearing in the text, teachers can also supply intensive exercises for specific topics where students need extra help.

The more students understand the linguistic aspects of the Japanese language with help of the CALL courseware, the more easily teachers are able to conduct classroom activities, the more clearly the purpose of classroom activities becomes to students, and the more easily students are able to follow the instruction. As a result, classroom activities become more productive, and will enhance the student's communicative skills in the Japanese language.

Consequently, when teachers who provide lectures on the Japanese language are not available in Japanese language instruction, CALL will be an excellent supplemental educational aid to increase the effectiveness of Japanese language instruction.

Effectiveness of CALL

Since the earliest days of foreign language instruction, teachers have been faced with the problems of different levels of competence and different styles of learning among students. Students are individuals, and the research has shown that in order to really be able to cope with these differences among students, a teacher would ideally have to provide each student with customized self-study materials with which they can work individually. Increasing the amount of recently developed computer-assisted language learning (CALL) programs seem to be the solution to these individual needs of students (Ruschoff, 1988).

According to Kaleugher (1990), advantages of computer-assisted language learning (CALL) can be viewed from the following three perspectives: (1) those that are related to the nature of the computer; (2) those that are beneficial to the teacher, and (3) those that are beneficial to the student.

An advantage of CALL related to the nature of the computer is the computers' flexibility. Computers can handle a wide scope of activities in foreign language instruction. Currently, there are three basic types of CALL programs in foreign language instruction: (1) drill and practice; (2) tutorial; and (3) simulation. In addition to these three programs, the most recent innovative form of teaching language through CALL is interactive video, the integration of the computer and video. These CALL programs enable foreign language teachers to provide students with exercises for habit formation such as grammar and vocabulary drills. They also make it possible for the teacher to enhance students' communicative language skills by providing them with real-life situations created by computer in

which students can learn the authentic language in a culturally appropriate manner.

Other advantages are the computer's accuracy, impartiality, and timelessness. Its interactive ability is also cited among the benefits inherent in the nature of the computer (Kaleugher, 1990).

As for the benefits of CALL to the teacher, the computer allows for randomly chosen questions to be presented to the student, enabling the student to work with a different lesson every time they begin. In other words, students can move through the materials at their own pace, and can repeat or skip segments of lessons according to their mastery of lessons (Garrett, 1991). Instead of having to generate endless new sentences on paper for students to work with, the teacher can enter core material into a program, and the same lessons will not be repeated, though the same material can be covered again and again (Kaleugher, 1990).

The most useful feature of the computer for the teacher is its ability to record student progress by tabulating statistics on the number of right and wrong answers, or even by recording and providing the exact student answers to the questions, and the number of times he or she tried. The computer can also record the amount of time spent on the exercise, and the frequency of use (Kaleugher, 1990).

This opens endless possibilities for teachers and researchers: the teacher can tailor lessons exactly to student needs, and the researcher is greatly advantaged in research on the effectiveness of CALL versus other materials (Kaleugher, 1990).

The computer can also be a great time-saver once the initial investment is made to develop the program, for most computer-based exercises are revised quickly and easily, and can be corrected automatically (Kaleugher, 1990).

Students also benefit in many ways from using the computer, and they have reacted quite positively to CALL's advantages of personalized, self-accessed, self-paced learning. Students also value the computer's ability to interact, and to deliver feedback instantly (Kaleugher, 1990).

Kaleugher (1990) points out that the use of computers in foreign language instruction seems to offer students several advantages: (1) The computer is able to meet their large demands for grammar exercises and rules that are not met in the classroom. In other words, the computer is able to give them necessary remedial practice without slowing down the more advanced students in class. Advanced students are also able to proceed to more advanced materials without being held back by other students; (2) The scores that the machine can generate are perceived as a motivating factor; and (3) using the computer is described as pure fun.

Quinn (1990) points out the three primary advantages of computer-assisted language learning (CALL) on students' learning: (1) it increases student interest; (2) it promotes retention of the subject matter while substantially reducing the time needed for instruction; and (3) it lightens the burden for both teachers and students by providing individualized, self-paced instruction.

In addition, the computer can provide consistent, accurate guidance to help students focus their efforts and learn more efficiently because the computer remains untiringly accurate and never loses patience (Quinn, 1990).

According to the study of Clark (1987), students who underwent each of a variety of language learning exercises on CALL programs performed in virtually every instance at a higher level than a control group.

Students like using the computer, and the computer makes learning fun. Iandoli (1990) points out that language teachers have reported that CALL is effective. Students enjoy CALL, their attention span is increased, and learning becomes quick and more concentrated. Therefore, students are able to master troublesome points of grammar through tutorials and drill and practice more effectively than through other materials.

In his study, Morris (1986), finds that students' response to using CALL programs is overwhelmingly positive. Students are continually asking for new exercises to complete. Students perform better in a more advanced class when they get to the units where they have done exercises on the computer, because they remember specific rules and structure that were reinforced by these drills.

A study by Rendall (1991) shows that tutorial programs provided by CALL increased students' awareness of the structure of language, and trained them both consciously and unconsciously, to concentrate on forms in a way not achievable by other media. The immediate feedback from the computer also encouraged students to re-think their thought processes, and revise their responses until they achieved a correct answer. This had the effect of practicing until they had mastered or acquired the particular element under study.

The advantages of computer-assisted language learning (CALL) may be found in three areas; the nature of computer, teacher's benefit, and student's benefit. It can be said that the use of CALL can offer tangible and substantial advantages to the students, teachers and researchers in foreign language instruction, from saving time to making instruction more interesting and fun. There is little doubt that the computer, if it is used wisely by professionals in the field, can be a positive addition to language pedagogy (Kaleugher, 1990).

In other words, it is fair to say that pedagogically sound CALL does offer the potential for the enormous enhancement of foreign language instruction which focuses on the individual student, and does effectively assist students in foreign language learning (Rhodes, 1991).

How Can We Develop Effective Courseware Using *HyperCard*?

Rationale for Using HyperCard *to Create Computing Courseware*

One of the problems with the use of computer-assisted language learning (CALL) in the classroom is that often the commercial software does not fit many teachers' needs. This may be either because teachers do not subscribe to the methodology used by the program for instruction, or because the program does not follow their sequence of instruction. Authoring systems can be an excellent alternative. Authoring systems enable teachers to make their own computer programs that are based on their curriculum. In other words, with authoring systems, teachers are able to integrate up-to-the minute material into their lessons (Morris, 1990).

In essence, authoring systems automate the process of writing computer-controlled exercises, and allow teachers to focus on how the content will be delivered and evaluated, rather than worry about problems related to computer programming (Quinn, 1990).

According to Beekman (1992), many teachers are discovering that authoring systems such as *HyperCard* allow them to create programs that make teaching more interesting and fun.

HyperCard is an authoring system developed by Apple Computer for the Macintosh computer, and is one of the most interesting and influential pieces of software to be released in recent years. With *HyperCard*, it is possible for nonprofessional programmers to create original software applications (Beekman, 1992). It is ideal for building pedagogically sound

customized educational courseware which fit particular lessons in foreign language instruction.

A *HyperCard* program called a stack consists of one or more cards that usually correspond to separate screens. A card can contain text fields, graphics, and buttons, and these are the basis of programming tools. In text fields, a teacher can simply type in material as in word processor. *HyperCard* provides a simple set of graphics tools to create screens or a teacher can use any other graphics programs to create visual images on the screen. Buttons are used to specify branching links from one card to another. Using buttons, a teacher can make links between cards which will control the procedure of courseware. To create a link between one card and another, a teacher simply defines a button, and then identifies which card a user wants to link to that button (Beekman, 1992).

Using the *HyperCard* program, a teacher can make courseware for classifiers in the Japanese language which will enhance student's habit formation in communicative contexts.

An Example of *HyperCard* Language Learning Courseware

The courseware for classifiers in Japanese language instruction "Ms. Smith's Shopping" (Kuwai, 1993) is specifically designed for the supplemental material for *Japanese: The Spoken Language part 1*. However, it is appropriate for the practice of classifiers in any beginning level Japanese course.

In English, both direct counting such as 3 books, 2 pencils, 4 friends, and so on; and classifier systems such as 2 pieces of pie, 3 loaves of bread, and so on, are used. However, the Japanese language employs only the classifier system for counting, therefore learners of Japanese are required to master quite a few classifiers for counting items which requires habit formation.

The effective practice for habit formation is memorization and repetition which is effectively enhanced by computer-assisted language learning (CALL) whose strength is individualization. *HyperCard* enables teachers to provide students with tutorials and drills that fit the curriculum, and allows them to work at their own pace. With the combination of graphics and text, *HyperCard* also enables teachers to present tutorials and drills in more realistic settings which will respond to current needs of communicative language skills in foreign language instruction.

Through shopping situations, students using this courseware are going to buy various items using appropriate classifiers. Graphics will be used to help students to visualize the situation, and experience the situation in a more direct fashion.

This courseware is composed of three parts: (1) the Drill Card; (2) the Help Card, and (3) the Vocabulary Card.

The Drill Card section consists of a series of dialogues between a customer and a sales clerk in a shopping situation. In this part, text fields are used to present dialogues, and graphics are used to create visual illustrations of the dialogues. Buttons are used for the student's selection

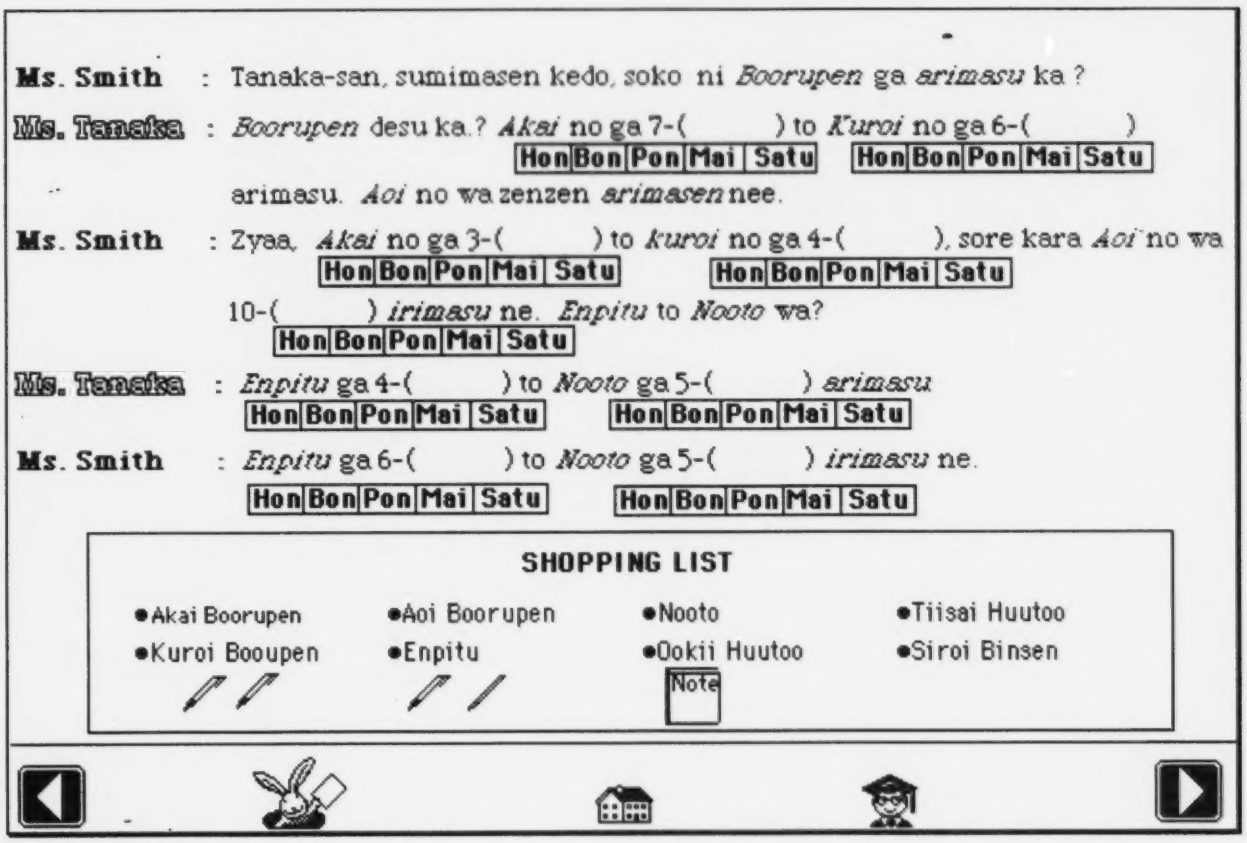
Ms. Smith : Tanaka-san, sumimasen kedo, soko ni Boorupen ga arimasu ka ?
Ms. Tanaka : Boorupen desu ka.? Akai no ga 7-( ) to Kuroi no ga 6-( )
Hon Bon Pon Mai Satu
Hon Bon Pon Mai Satu
arimasu. Aoi no wa zenzen arimasen nee.
Ms. Smith : Zyaa, Akai no ga 3-( ) to kuroi no ga 4-( ), sore kara Aoi no wa
Hon Bon Pon Mai Satu
Hon Bon Pon Mai Satu
10-( ) irimasu ne. Enpitu to Nooto wa?
Hon Bon Pon Mai Satu
Ms. Tanaka : Enpitu ga 4-( ) to Nooto ga 5-( ) arimasu
Hon Bon Pon Mai Satu
Hon Bon Pon Mai Satu
Ms. Smith : Enpitu ga 6-( ) to Nooto ga 5-( ) irimasu ne.
Hon Bon Pon Mai Satu
Hon Bon Pon Mai Satu
SHOPPING LIST
●Akai Boorupen
●Aoi Boorupen
●Nooto
●Tiisai Huutoo
●Kuroi Booupen
●Enpitu
●Ookii Huutoo
●Siroi Binsen
Note

Figure 1. Drill card.

of a response. If a student's response is correct, the student's response appears in the blank in the dialogues. If a student's response is incorrect, the Drill Card is automatically linked to the Help Card, which provides the student with an explanation. The student is also able to access the English equivalent of new vocabulary introduced in the lesson on the Vocabulary Card by clicking on the new vocabulary button indicated by italic letters on the Drill Card.

The Help Card contains grammatical explanations. When a student makes a mistake on the Drill Card, a button on the Drill Card automatically links the Drill Card to the Help Card to provide a grammatical explanation. By reviewing the Help Card, the student is able to figure out his or her mistakes and re-think his or her answers until he or she determines the correct answer. In this card, fields are used for grammatical explanations, and graphics are used to enhance grammatical explanations with visual images. Grammatical explanations are hidden, and buttons are used to show them on the screen so that a student only accesses the necessary grammatical explanation when needed.

The Vocabulary Card consists of Japanese words and their English equivalents. The new vocabulary words are indicated by italic letters on each Drill Card and are linked to the Vocabulary Card by buttons. Whenever a student clicks on a new vocabulary word on the Drill Card, buttons automatically link the Drill Card to the Vocabulary Card. Fields are used for new Japanese words, and their English equivalents. Graphics are used to provide a visual image of each word. English equivalents are hidden, and buttons are used to show English equivalents of Japanese words on the screen. In this way, a student can only access the English equivalent for the Japanese word that is necessary at the moment.

Exercises

According to Kahn (1990), in order to write exercises that hold students' attention and help them remember what they are practicing, teachers need to be aware that language learning is more productive when material is presented and practiced in context rather than as discrete items, when attention is focused on meaning instead of grammatical forms, and when learners must solve problems rather than just the describe situation. Language acquisition is also more effective when students can relate to the material personally, such as when it is amusing or emotionally simulating. It is also important to provide feedback that truly guides learning. The most effective feedback is to provide hints that help students discover the correct response (Kahn, 1991). The courseware "Ms. Smith's Shopping" seems to fit what Kahn (1991) calls "interesting courseware."

Exercises in this courseware are presented in dialogues which occur during various shopping situations typical in Japan. To proceed through the exercises, students are required to choose the appropriate classifier appearing in dialogues between a sales clerk and a customer. Instead of memorizing classifiers as isolated items, students learn classifiers as a part of the context actually used in dialogues.

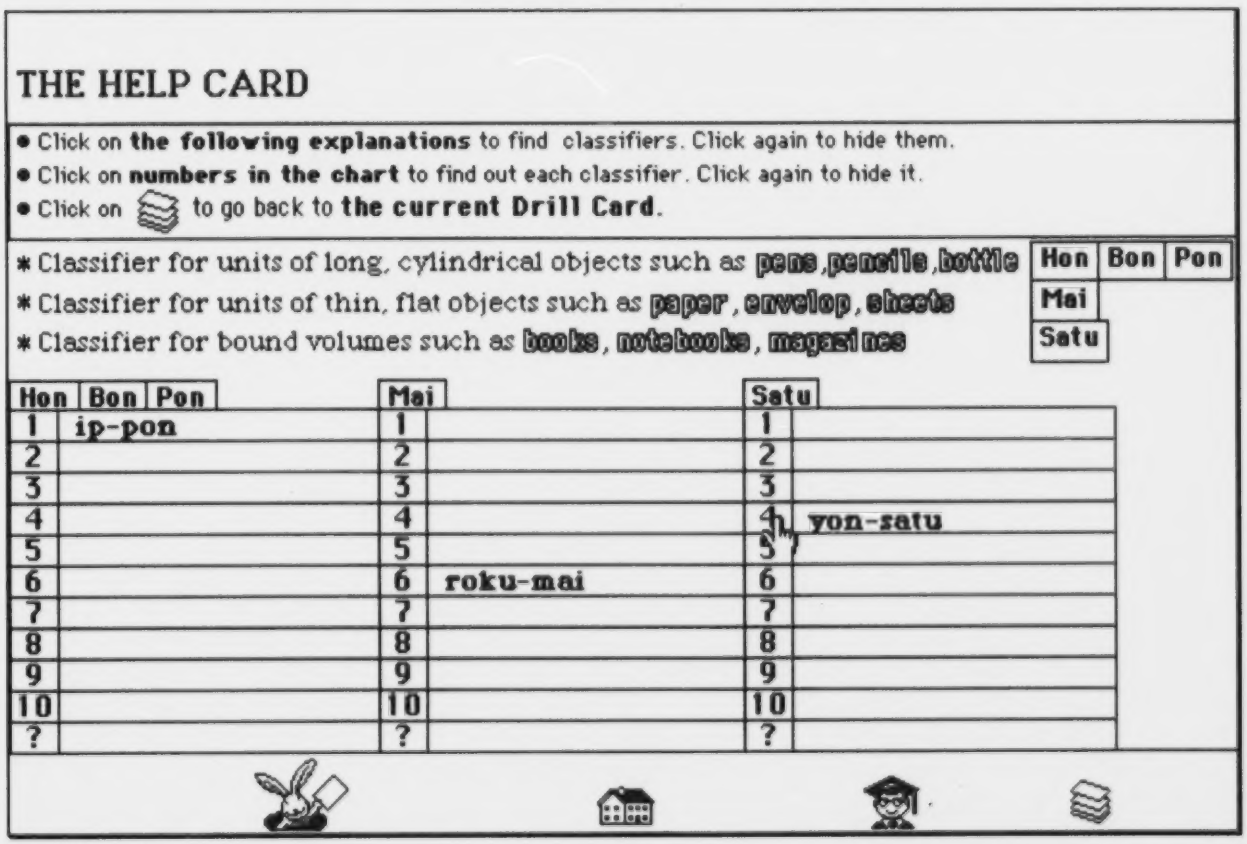

Figure 2. Help card.

When students make mistakes, the courseware provides grammatical explanations so that students are able to figure out and correct their own mistakes.

Consequently, students become able to use various classifiers through problem-solving exercises in realistic shopping situations. Immediate feedback from the computer reinforces students' learning.

With the flexibility of CALL, teachers can add a newly introduced classifier in future lessons to the courseware. The courseware can be used not only for supplemental practice for on-going classroom activities, but also to review materials for the semester, or whenever teachers think review is necessary.

Summary

Because of the recent popularity in Japanese language learning in the United States, the number of Japanese language programs has increased dramatically. However, its increase is too rapid to offer adequate instruction and adequate materials. It is the teacher's responsibility to facilitate the best learning outcomes from students in a given teaching environment. Computer-assisted language learning (CALL) can be an effective educational aid for Japanese language instruction to supplement this limited teaching condition.

Easy-to-use authoring systems such as *HyperCard* enable teachers to write lessons as needed, and to monitor students understanding of materials through their performance on the courseware.

For more pedagogically sound courseware, it would be ideal that tutorials for linguistic aspects of the Japanese language be developed by teachers specialized in linguistics who generally lecture on Japanese language. With the flexibility of computers, such courseware may be modified by teachers to fit their specific needs.

A primary problem remaining in the implementation of CALL into Japanese language instruction is the lack of adequate courseware. As a result, teachers need to develop their own courseware which requires an investment of time and skills. What is required to help teachers to implement CALL in their Japanese language instruction is professional level interest among linguists, educators, and technology specialists to develop effective courseware, and teacher training programs which provide teachers and teacher candidates with not only methodological skills in teaching, but also technological skills to utilize the effectiveness of the computer in Japanese language instruction.

Teacher's understanding of students' needs, and a willingness to meet these needs as effectively as possible are essential to progress in language teaching (Quinn, 1990). It is the teachers who need to integrate their teaching method with computer-assisted language learning for more successful Japanese language instruction. *HyperCard* or some other authoring system may be the most effective tool for this task.

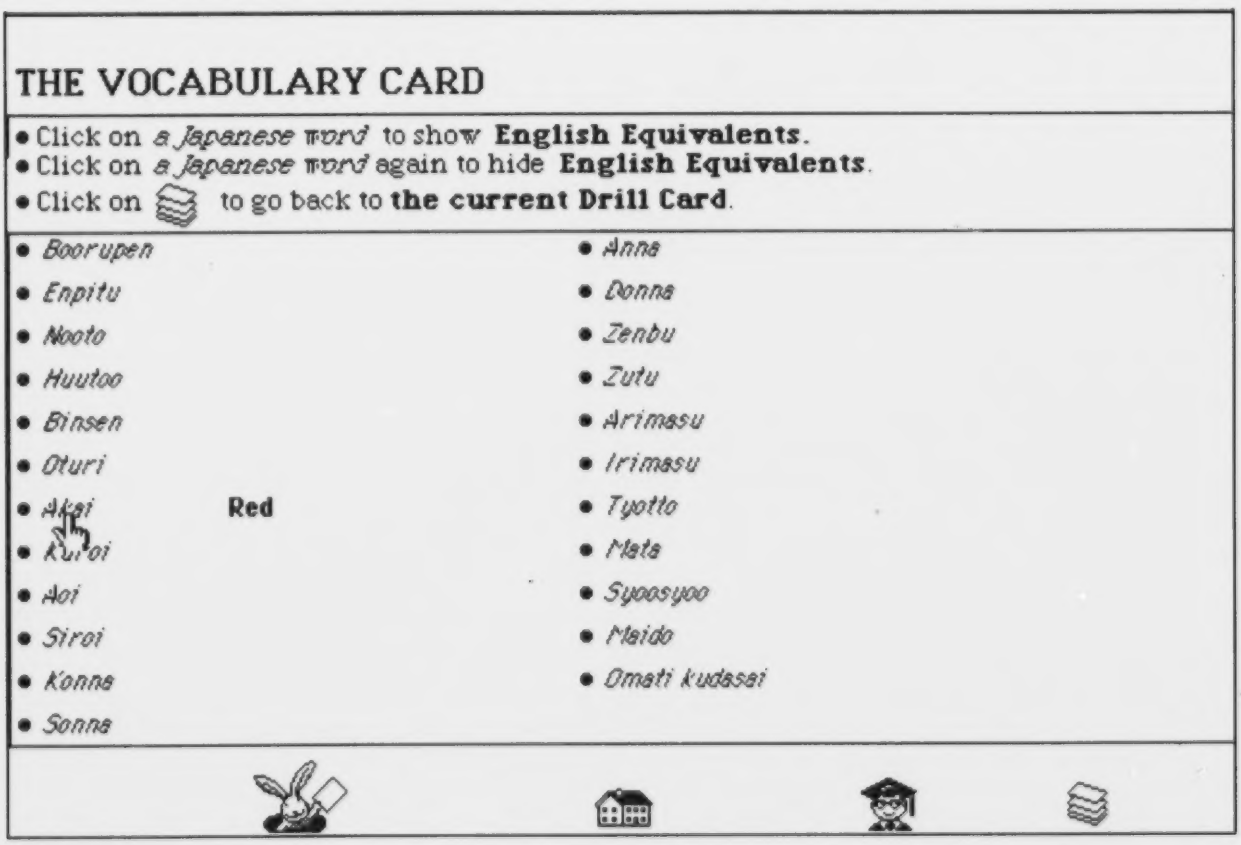

Figure 3. Vocabulary card.

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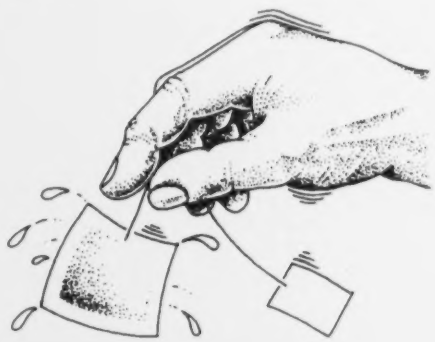

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Attitude And Retention Effects Of Graphic Organizers During An Interactive Videodisc Lesson

Richard A. Castelluccio

Abstract

The purpose of this pilot study was to determine the effects of using graphic organizers, during an interactive videodisc (IVD) lesson, on the retention of information in teaching branches of government and on learners' attitudes toward the use of technology as a learning tool. The subjects were 90 eighth grade students. The treatment consisted of a Level III interactive videodisc lesson on the executive branch of government. A one between, one within repeated measures design was used to analyze retention data. Attitude toward the use of the technology as a learning tool was measured by administering a pretest-posttest Likert-type survey. Results showed that differences in attitudes toward the technology as a learning tool were significant ($p = .001$). Differences in retention of information was not significant ($p > .20$). However, subjects showed indications of "forgetting" less information than that of the normal forgetting curve.

Introduction

One of the many challenges confronting educators is to use new technologies effectively and creatively. Interactive hypermedia, a combination of text, audio and visuals, give educators a potentially powerful tool for use throughout the curriculum. Hypermedia technology shows the promise of motivating learners and translating abstract ideas into concrete examples (Martorella, 1991).

Interactive videodisc (IVD) instruction can generate interest as an instructional delivery tool and is effective in improving the performance of learners (Dalton, 1990). Few studies, however, have concentrated on the learner's retention of information when IVD is used to deliver instruction.

The purpose of this pilot study was to examine the differential effects on a learners' ability to retain information, both intermediate and long-term, after an interactive videodisc (IVD) lesson on the executive branch of government. This study also examined learners' attitudes toward the technology as a learning tool.

Graphic organizers are visual illustrations of verbal statements (Jones, Pierce & Hunter, 1989). A graphic organizer includes flow charts, webs, and/or concept maps. They help learners comprehend information in ways that surpass verbal statements. This involves nonlinear thinking and can show relationships and connections at a glance.

There is research support that visual learning can improve memory. Kosslyn's Mental Image Theory (1981) is intended to provide accounts of the mental picturing process and of transforming images in various ways (surface representations). The theory also specifies when images will be used in the retrieval of information from memory (deep representations). The surface representations are generated from the deep representations in long term memory. The human mind stores information in non-spatial units, just as files stored on a computer. When a stimulus occurs, image processing is generated when a surface image (which is a graphic) is formed based on the information stored in long-term memory.

Evidence exists to support instruction that includes symbolic learning (words) and visual learning (webs, pictures and graphics). Dual encoding research suggests that different types of images can influence learning and memory (Clark & Salomon, 1985). Information presented in these two modes improves the memory of learners (Vasu & Howe, 1989). When learners experience an object, and a description of the object, more information will be retained than if no description accompanies the object. This dual encoding system enables the learner to view the image to be learned, and use language to help store this new knowledge in memory. When information is coded and stored in memory symbolically and visually, retention is expected to improve. Vasu & Howe (1989) found that learners store more information in the form of images than in verbal form. Also, learners recalled more information when visual and verbal representations are used simultaneously, rather than one without the other.

The contiguity principle also supports this view. This instructional design principle states, "... that the effectiveness of multimedia instruction increases when words and pictures are presented contiguously in time and space" (Mayer & Anderson, 1992). This principle was developed from the dual encoding theory that assumes learners' possess two distinct information processing systems, one representing information verbally and the other visually. The contiguity principle further states that learners can more easily make connections among information when words and pictures are presented contiguously. Retention is also improved when connections are made with words and pictures.

Interactivity forces students to become active learners because the computer and videodisc are manipulated by the learner. The videodisc and computer respond to the learner, rather than the learner responding to the media. If the learner is focused, and interacting with the computer and videodisc, mental effort increases (Levin, 1991; Borsook & Higginbotham-Wheat, 1991).

Learners seem to like learning when interactive video is used as the instructional medium. Learners' attitudes toward technology are generally positive (Billings & Cobb, 1992). When learners' attitudes toward the use of technology are compared with other instructional methods, such as lecture, reading or worksheets, attitudes are also positive. Positive attitudes increase as familiarity with the technology increases, especially when using interactive technology (Bain et al., 1992).

In contrast to conventional methods of instruction, interactive video, with high levels of imagery and opportunities for realistic simulations, offers a richer learning environment (Martorella, 1989). Along with the use of *HyperCard*, which provides images, text and sound, interactive video empowers learners. *HyperCard* provides the link between images and text, and along with interactive videodisc instruction can improve the quality of learning and instruction (Bohren, in print).

More specifically, the following questions were investigated in this study:

1. What is the effectiveness of graphic organizers on the retention of information during an interactive videodisc lesson? The dependent

variables were immediate recall, intermediate retention, and long-term retention.

2. Do learners like using IVD technology? The dependent variable was the learners' attitude toward the technology as a learning tool.

Method

Subjects

The subjects were 90 eighth grade students from a large midwestern urban school district. Learners were part of three intact classes, randomly assigned to the treatment or control condition. Partners were randomly assigned within each intact group. The sample consisted of 70% African-American students and 30% white students. Approximately 70% of the school's population is low socio-economic status. Each of the two experimental groups had 26 and 30 subjects respectively. The control group consisted of 30 subjects. Four subjects were dismissed from the study due to excessive absences, and/or incomplete data.

Procedures

The treatment consisted of a Level III interactive videodisc lesson on the executive branch of government. A Level III videodisc lesson allows students to manipulate the videodisc by interacting with the computer. Each pair of students was instructed to develop a graphic organizer, such as a web, to identify facts about the executive branch of government at the federal level. When appropriate, students used visuals and/or images from the videodisc. A predetermined list of images was selected by the teacher from which the students could choose. The videodisc was Optical Data's Powers of the U.S. Government. Students were encouraged to build their graphic organizers on multiple levels of *HyperCard*, which includes visuals, sounds, symbols and other graphics. This was accomplished during American history class, for nine days.

The control group received the same information over the same time period. Instruction included lecture, bookwork and classwork corresponding to the topic. Students in the control group were also randomly assigned partners.

Upon completion of the lesson, each student completed an immediate recall posttest (IP). Fourteen days after the posttest was administered, an intermediate retention test (IR) was administered. Thirty-three days after the posttest was administered, a long-term retention test (LR) was administered. The retention instruments were the same as the immediate recall test. All tests were administered on an individual basis and test results were not shared with the subjects at any time during the study.

The dependent variables of immediate recall, intermediate retention and long-term retention were measured by a teacher developed instrument. There were 35 multiple choice items, with four possible answers. Some of the items on the posttest were taken from the Ohio Proficiency Practice Test on citizenship, other items were teacher developed.

Immediate recall was measured by the number of correct responses on a posttest. A typical item on the posttest was, "The main function of the executive branch of government is to (a) enforce laws; (b) make the laws; (c) meet with foreign diplomats; (d) publish information." The Alpha reliability coefficient for the immediate posttest was .63. Intermediate retention was measured by the number of correct responses on a test administered fourteen days following treatment. The Alpha reliability coefficient on the intermediate retention test was .78. Long-term retention was measured by the number of correct responses on a test administered thirty-three days following treatment. The Alpha reliability coefficient for the long-term retention test was .73.

Attitudes toward the use of technology were measured by administering a 10 item pretest-posttest Likert-type survey administered to the subjects in the experimental condition. The survey was designed to measure attitudes toward the use of technology as a learning tool. A typical item on the survey was, "I like learning with the computer." Responses were a five part scale ranging from "Strongly Agree" to "Strongly Disagree." The Alpha reliability coefficient for the pretest was .64. The Alpha reliability coefficient for the posttest was .71.

Design

This study was a quasi-experimental multiple group time series research design. Repeated measures of the dependent variables were collected at three separate time periods. The independent variable under study, graphic organizers with interactive video, was introduced and the data examined to determine if retention of information and attitude toward technology was enhanced.

A one between, one within repeated measures design was used in this study, teaching method x time. Subjects' paired mean scores were used for analysis at the .10 alpha level. The .10 alpha level was used due to the small number of scores and the use of intact groups. Practically speaking, this design was used to determine if this teaching method enables students to retain more information than that of the control group.

The attitude data was analyzed by a t test for correlated samples. Subjects' pretest and posttest scores were used for analysis at the .05 alpha level. The t test was used to determine if subjects' attitudes toward technology positively increased.

Table 1. Descriptive Statistics for Retention Data

Immediate Posttest	**Means**	**Sd Deviation**	**Number**
Group 1	20.54	3.43	13
Group 2	20.90	3.01	15
Group 3	21.57	3.17	15
Total	21.02	3.15	43
Intermediate Retention	**Means**	**Sd Deviation**	**Number**
Group 1	23.19	4.24	13
Group 2	24.03	2.34	15
Group 3	22.73	3.06	15
Total	23.32	3.23	43
Long-term Retention	**Means**	**Sd Deviation**	**Number**
Group 1	23.23	4.44	13
Group 2	23.30	3.60	15
Group 3	23.63	3.09	15
Total	23.40	3.63	43

Groups 1 & 3 are treatment groups.
Group 2 is the control group.

Results

Retention Data

A repeated measures multivariate analysis of variance (MANOVA) was performed on the retention data. The analysis failed to reveal significant differences [F(4,76)=1.51, p=.207]. Means and standard deviations are presented in Table 1.

Attitude Data

A t test for correlated samples was performed on the attitude data. The differences between the subjects' pretest and posttest scores were compared. A significant difference was found with the subjects showing more positive attitudes toward the technology as a learning tool on the posttest ($t = -3.59$, $df = 49$, $p = .001$). Descriptive statistics are presented in Table 2.

Discussion

This study examined the effects of graphic organizers, when used with interactive videodisc instruction, on retention of information. Subjects' attitudes, toward the technology as a learning tool, was also examined. At the end of the lesson, subjects completed a series of three recall tests over time and an attitude questionnaire.

The use of graphic organizers, with interactive videodisc instruction, demonstrated an increase in information gained and a lack of "forgetting." The subjects' performances on the tests of immediate recall (IP), intermediate retention (IR), and long-term retention (LR) are displayed in Figure 1.

In relation to the immediate recall test, higher performance was evidenced by subjects over time. These findings are consistent with previous findings on increased performance when visuals and imagery are used as part of the instructional design (Murphy & Davidson, 1991; Martorella, 1991; Clark & Salomon, 1985; Cronin & Cronin, 1992; Ritchey, 1982).

One possible explanation for the results is that information presented in two modes improves the memory of learners (Vasu & Howe, 1989). The use of graphic organizers and images from the videodisc combined to increase performance on both retention tests. Research indicates that mental imagery is held in human memory and supports perceptual inferences which are much easier to understand. Images can be better representations of information because indexing of information can support useful and efficient processes for better problem solving (Larkin & Simon, 1987).

Another possible explanation is the subjects in the lesson continued to receive instruction in other branches of government. The additional exposure may have enabled learners to develop connections and learn material previously unlearned. As Mayer and Anderson (1992) pointed out, performance on retention tests depends on a learner's representational connections. These connections are made easier when words and images are part of the instruction.

Learning and retention are inextricably bound together (Hall, 1966). Retention is the amount of previously learned material which persists or has been retained by the person. The information lost or not retained is forgetting. Forgetting is rapid in the first 24 hours. After 24 hours, the rate of forgetting declines. Learners only retain about 20% of the material after one month, and this material usually stays with the learner. Ebbinghaus's forgetting curve (1913) is displayed in Figure 2.

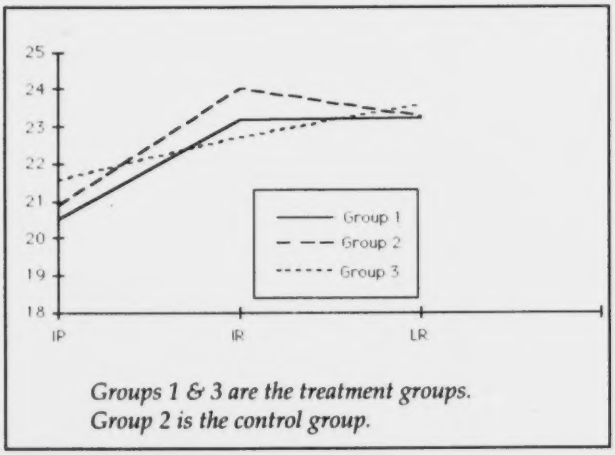
Results of this study seem to indicate that subjects forgot less than the normal forgetting curve. The human mind stores information in non spatial units, just as files stored on a computer. Then when a stimulus occurs, image processing is generated when a surface image (which is a graphic) is formed based on the information stored in long-term memory. If a fact happens to be the stimulus, imagery is likely to be used if the fact is about the visible property of an object (Kosslyn, 1981). Subjects are likely using long-term memory to form the images from the use of graphic organizers, thus the lack of forgetting.

The results of this study suggest that subjects forgot less information using graphic organizers and interactive video than that of the forgetting

Table 2. Descriptive Statistics for Attitude Data.

	Means	SdDeviation
Pretest		
N=50	34.66	5.161
Posttest		
N=50	37.44	5.076

Groups 1 & 3 are the treatment groups.
Group 2 is the control group.



Groups 1 & 3 are the treatment groups.
Group 2 is the control group.

Figure 1. Mean scores of Retention Data.

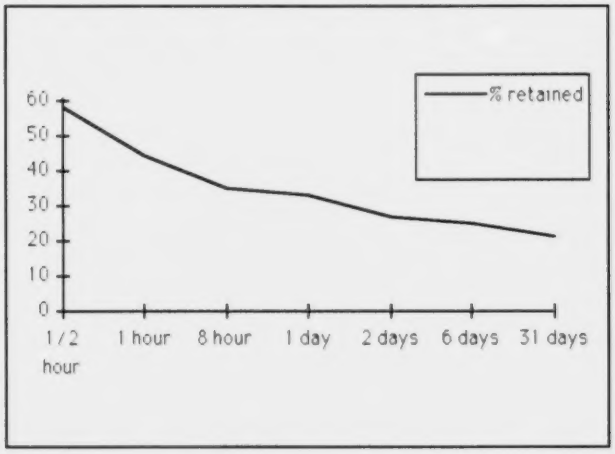


Figure 2. Ebbinghaus's Forgetting Curve..

curve. Therefore, replication of this study is indicated. Giving subjects more time and practice using *HyperCard* may enhance the study. Subjects of this study had minimal experience with *HyperCard*. Using subjects of varying ages and socio-economic status would enhance the generalizability of the findings.

The results of this study also revealed that subjects' attitudes toward the technology as a learning tool were more positive. The subjects' responses to the attitude questionnaire are displayed in figure 3.

The findings of this study related to attitude are consistent with other findings (Simsek & Tsai, 1992; Dalton, 1990; Billings & Cobb, 1992). An explanation of significant differences in attitudes might be the attentiveness of the learner (Thompson, Simonson & Hargrave, 1992). Learner involvement is required with interactive video. When learners are actively involved it is likely they will value the learning positively. In interactive video instruction learners can design their own paths when exploring information, and this gives the learner control of the learning environment.

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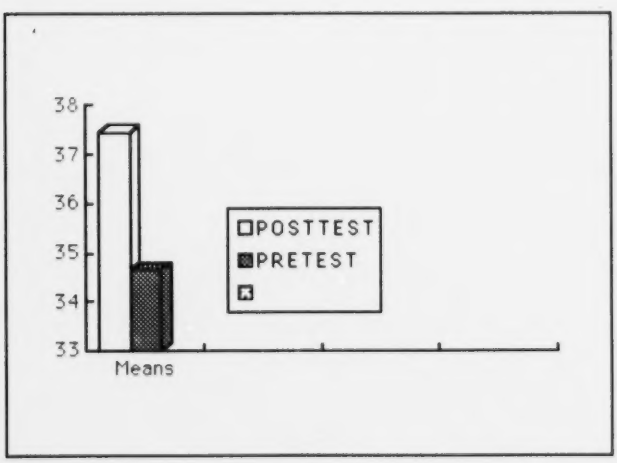

Figure 3. Mean Scores of Attitude Data.

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Instructional Design Considerations in Developing Hypertext/Hypermedia in Instruction

Yusup bin Hashim &
Razmah bt. Man

Abstract

The purpose of this paper is to discuss the definition, concept and characteristics of hypertext/hypermedia and its advantages and potentials in instruction and training. Hypertext/hypermedia offers great promise in construction, storage and dissemination of large chunks of information. In Malaysia, hypertext/hypermedia is very new and rarely used in education and training. Hypertext (Nelson, 1981) can be defined as large chunks of textual information that are written in non-linear form. It is a text that branches out and allows choices to the reader and best read using an interactive screen. Hypermedia consists of texts and graphic supported by other media attributes such as sound, animation and visuals centered upon a personal computer. The focus of discussion is on the development of hypertext instructional materials using four hypertext instructional design. Examples of structuring and presenting hypertext lessons are given.

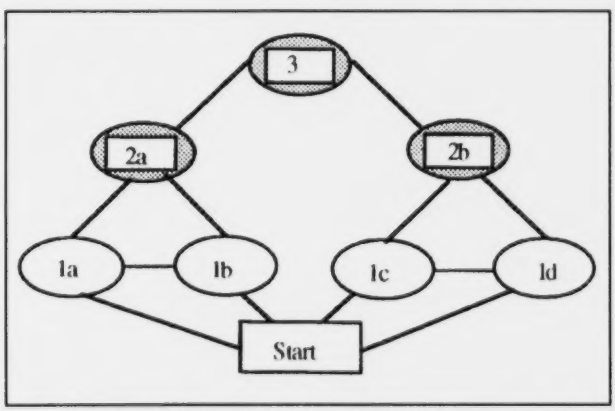

Figure 1. Hierarchial design.

Origins and Definitions of Hypertext / Hypermedia

What is hypertext? It is a term coined by Ted Nelson in 1965 (through his famous Xanadu Project) to mean... non sequential writing, text that branches and allows choices to the reader, best read at an interactive screen or non sequential writing with free user movement (Nelson, 1987). In fact, the history of hypertext goes back 20 years earlier when Vannevar Bush conceptualized memex, a powerful machine which could store information such as books, pictures, records, and letters. Through memex, he imagined that the user could have access to large chunks of information with speed and flexibility in an associative manner, similar to how the mind works, jumping from one thought to another thought. Of course, in Bush's time, this was only a dream.

Twenty years later, Douglas Engelbart (1963) inspired by Bush's idea of memex, developed a hypertext system called 'Augment' which enabled the user to create hypertext document with a colleague 500 miles away. His system has evolved over the years and till today it is used to support communication among software engineers.

After Engelbart, more and more hypertext systems have been developed. All of the early works were done on large computer systems since microcomputers had not been invented. Today with microcomputers around, a number of hypertext systems have appeared such as *Guide 1.0* (1986), *HyperCard 1.2.2* (1987), and *HyperCard 2.0* (1989), as well as *LinkWay* and *ToolBook* for the IBM.

Let's define hypermedia. According to Jonassen (1988), hypermedia is a subset of hypertext. He explained that the relationship is not based hierarchically but historically since hypertext has existed more than 20 years earlier. Hypermedia only appeared in the late 80s. But, if media is

Table 1. Hierarchical design: Learning Unit—producing instructional overhead transparencies

Node	Epitome	Objective type		Content type			
		Terminal	Subordinate	Procedural	Conceptual	Theoretical	Verbal Information
1a	Selecting legible letters		/		/		
1b	Identifying letter type		/		/		
1c	Simplicity		/		/		
1d	Spacing		/		/		
2a	Techniques of producing OHT		/	/	/		
2b	Operating transparency maker		/	/			
3	Producing thermal OHT		/		/		

defined as resources that include print (text) and non-print materials, textual materials may fall under the realm of media. Similarly, instruction is a subset of education. If we are to take this analogy, then hypertext is a subset of hypermedia. Hypermedia is a higher technology that combines motion pictures such as film and video, computer graphics, sound, music and text in a unified information delivery system centered upon the microcomputer. The user navigate freely through a multimedia-based information.

The difference between hypertext and hypermedia is their ability to support a designer in the creation of multimedia hyper-applications. Hypermedia allows creation of graphic, digital sound and animation from within the development structure, in addition to text and data components. Hypertext allows access to and some manipulation of these elements, but require the developer to use other development tools for initial generation of the components as in *Guide* (hypertext system) and *MacPaint* (graphic tool).

Concept of Hypertext/Hypermedia

Hypertext/hypermedia consists of chunks or fragments of text or other information in the form of graphics, videos and digital sound. Nodes and links are the basic building blocks of all hypertext/hypermedia system. Nodes are the basic unit of information and they are linked together. Users can have access to the network of nodes in any sequence that meets their information needs. Links connect one node, frame, or card to another, and thus facilitate the user to jump from one node to another.

There are different types of links, for example: referential links, organizational links, replacement links, note links, command links, and menu links. Conklin (1987) described referential link as a link that connect a source in the current node to a referent in the destination node. The user is typically allowed to return through the same link. He describes organizational link that connect a parent node to its children in a tree fashion.

A replacement link causes the entire text in the current window to be replaced with the text from another node. It connects the node of the current window to a text of another node.

A note links causes a note to pop out in a small window in the screen. Usually users can still see most of the original node and refer to it along with the pop out note.

A command link instructs the computer to carry out a specific operation not displaying additional information. This link is useful in hypertext performance aids.

A menu link is simply a link that allows the menu to be displayed when the link is selected. The user may then be able to branch off to several different kinds of nodes.

Instructional Design in Hypertext/Hypermedia

One major weakness in developing computer-based instruction (CBI) is the lack of instructional design principles. It is very easy to develop bad CBI on a good computer. So good or bad CBI has nothing to do with the computer per se. However, the authoring tool may be as equally important as the design aspect in developing good CBI.

In this paper, four types of hypertext/hypermedia design for CBI or hypertext/ hypermedia in instruction (HAI) are discussed:

1. Hierarchical structured design
2. Simple-to-complex structured design
3. Guided unstructured design
4. Unstructured design

Hierarchical Structured Design

The hierarchical design is derived from learning hierarchical model (Gagne, 1985, Aronson & Briggs, 1983) and Jonassen blocked hierarchical design (1986). In this model, representations might be learning hierarchies in which links are established between nodes containing information prerequisite to others. This link is called "organizational link" (Locatis, et al., 1989; Akscyn et al., 1988; Halasz, 1988; Conklin, 1987) where a node at one level can only access node directly above or below them. Sometimes access to higher or lower level node is "blocked" to cater for slow and fast learners.

For a brief explanation on how this design works, refer to Figure 1 and Table 1. In this design, node 3 represents the terminal objective, stated in behavioral term: How to produce overhead transparencies. In sequence, starting form the bottom, node 1a and 1b represent principles of lettering that is selecting legible letters and identifying the different types of letters, respectively. Node 1c and 1d deal with principles of graphic that is concept of simplicity and spacing, respectively. Nodes 1a, 1b, 1c and 1d form the subordinate skills which are prerequisites to the higher level skills. Node 2a then represents the various techniques of making overhead transparencies as in overlay, masking and stripped techniques. Node 2b represents operating the transparency maker. As you notice, the kinds of learning are procedural or rule in nature with concept content to support procedural learning. In this case, 1a, 1b, 1c, and 1d form the concept content. Nodes 2a and 2b can be further expanded or elaborated. This is similar to what Reigeluth (1983, 1987) suggested in his elaboration theory in instructional model.

Simple-to-Complex Structured Design

The simple-to-complex design is derived from elaboration theory (Reigeluth and Stein, 1983) and the advanced organizers theory (Ausubel, 1968). In this design, learners/users may access nodes at the simplest and most fundamental level(s) in the knowledge base and gradually move up or "zoom in" and progress to the level(s) of detail and breadth desired. For example in Figure 2 and Table 2, node 1a indicates the purpose of the design that is instructional overhead transparencies. Moving from node 1a, it is connected (organizational link) to nodes 2a, 2b, 2c and so on in a

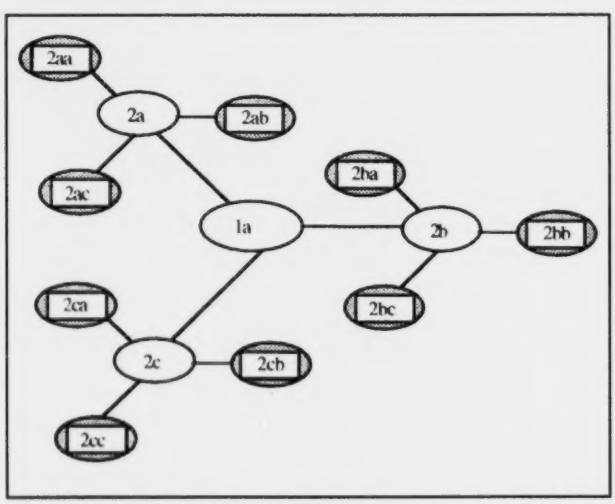

Figure 2. Simple to complex structured design.

tree fashion. Higher level nodes as in 2aa, 2bb, 2cc may be blocked until node 1a is mastered.

Node 2a represents the procedural content that prescribes the "how" of making overhead transparencies; node 2b the conceptual content, that is, the "what" or principles of using transparencies; and node 2c the theoretical content, that is, the "why" of using transparencies.

Guided Unstructured Design

The guided unstructured design allows users to have random access from any node similar to the unstructured design (Pask, 1976; Locatis, Letourneau & Banvard, 1989; Jonassen, 1989). In Figure 3, all plain nodes (1a, 2a, 2b, 2c, 2d etc.) and shaded nodes (2ad, 2ae, 2bd, 2be, 2cd, 2ce, 2dd and 2de) are linked together by menu link and referential link respectively. But shaded nodes are not primary nodes. Primary or plain nodes are designed for knowledge acquisition or information retrieval. Shaded or secondary nodes provide more information or to develop cognitive structures. Such kind of instructional strategy is more suitable for cognitive enrichment.

In this design, instructional designers could suggest or guide the learning sequence when the learners navigate from plain to shaded nodes. The shaded nodes are open for them but may have to be used wisely. Some kinds of cues/hints should be given at shaded nodes. Unlike the hierarchical or the simple-to-complex design, some nodes are blocked especially the higher level skills in order to avoid cognitive overload. An example of how the content of guided unstructured design is structured and presented is given below:

To begin the hypertext lesson on instructional media (node 1a), the learner has to:

1. Click open the menu link as in node 1a. Four topical nodes appear in the window. The topics are:
   1.1. Node 2a: Definition of instructional overhead transparency
   1.2. Node 2b: Definition of instructional slide
   1.3. Node 2c: Definition of instructional video
   1.4. Node 2d: Definition of instructional module

2. After reading the topic on definition of instructional overhead transparencies, click open node 2a and five more sub-topical nodes appear in the window screen. These nodes provide more information on instructional transparencies. They are:
   2.1. Node 2aa: Types of overhead transparencies
   2.2. Node 2ab: producing overhead transparencies
   2.3. Node 2ac: Using overhead transparencies in instruction
   2.4. Node 2ad: Studies on overhead transparencies
   2.5. Node 2ae: Potentials and advantages of overhead transparencies in teaching and learning.

A learner can navigate freely from one sub-topical nodes to another. However, when it comes to nodes 2ac and 2ad, the learner is advised/suggested not to open these nodes unless he or she has gone through nodes 2aa, 2ab and 2ac. The learner may open these nodes, but by doing so, may cause cognitive overload. In hierarchical or simple to complex design, the nodes are blocked and to have access to these nodes, the

Table 2. Simple to complex design: Learning unit—producing instructional overhead transparencies (OHT).

Node	Epitome	Content type			
		Procedural	Conceptual	Theoretical	Verbal information
1a	Instructional OHT	/			/
2a	How to make OHT	/	/		
2b	Principles of producing OHT				/
2a	Why OHT?			/	
2aa	To prepare write-on OHT	/			
2ab	How to prepare thermal OHT	/			
2ac	How to use transparency maker	/		/	
2ba	What is overhead projection?		/		/
2bb	Types of OHT		/		/
2bc	Legibility standards		/		/
2ca	Advantages of using OHT			/	/
2cb	Research findings on OHT			/	
2cc	Contributions in training and education			/	

learner may be asked to sit for a test and attain certain qualifying grades. In guided unstructured design, there is no test given to navigate the shaded nodes. Shaded or secondary nodes make provision for learners to build cognitive structures. For example, in node 2ae, learner may be asked to list the advantages of using overhead transparencies. Learners construct and build up the hypertext lesson through active collaboration with the designers. The collaboration and interaction form the basis of hypermedia learning. Meaningful learning will result from hypertext if it supports the active construction of knowledge by the learners who engage it (Jonassen, 1993). The learning process in hypertext/hypermedia does not only support information retrieval, knowledge acquisition and problem solving (Jonassen and Wang, 1990) but also support constructivism.

Unstructured Design

In this design, information gathered through hypertext/hypermedia may be unstructured. Learning only takes place when a learner is able to reorganize the knowledge gathered from hypertext/hypermedia by reorganizing the knowledge structures. Knowledge structures refers to organization or structuring of ideas in semantic memory which is often called schema (Jonassen, 1988). A schema consists of a set of attributes that a learner forms around an idea or concept.

The unstructured designed in hypermedia allows user to have access to any node he chooses. To design the unstructured hypertext, the designer (subject specialist) has to identify the attributes of the schema and create a semantic network. In this hypertext lesson the schema or node is instructional media (see Figure 4). The schema or node 1a is connected to other schemas such as nodes 2a, overhead transparencies, 2b, slides, node 2c, videos and node 2d, modules. The schema for Node 2b, slides consists of node 2aa, types of slides, 2ab, producing slides and 2ac using slides and so are the other 3 nodes. Since there are too many nodes or information that can be accessed at random from any node, the learner has no control over them. As a result, the learner may got lost in hyperspace or caught into a sea of information. This kind of design may be suitable for adult learners. The unstructured design may function as information storage and retrieval.

Review

To sum up, each of the four designs discussed has the following characteristics:

Hierarchical structured design:

1. Lesson is sequenced according to hierarchy of learning
2. Nodes representing higher order skills are blocked. Learner cannot have access to higher node unless he or she has mastered the lower level skills.
3. Goals and objectives predetermined.

Simple to complex structured design:

1. Lesson is sequenced from simple or general overview of the lesson to more elaborated lesson.
2. Nodes representing more difficult or elaborated topics are blocked. Learner cannot navigate freely between nodes.
3. Goals and objectives predetermined

Guided unstructured design:

1. Information can be accessed at random from any node except in shaded nodes where learner is advised not to try them unless he or she is ready.
2. Information is not structured and sequenced.
3. User can jump immediately to any topic within the hypertext lesson by pressing the keyboard or clicking the mouse.
4. Collaboration exist between the user and the designer (only when approaching the shaded nodes).
5. The design is knowledge acquisition and construction.

Unstructured design:

1. Information can be accessed at random from any node.
2. Information is not structured and sequenced.
3. User can jump immediately to any topic within the hypertext lesson.
4. The design is for information retrieval and for browsing
5. No interaction or collaboration between user and designer.

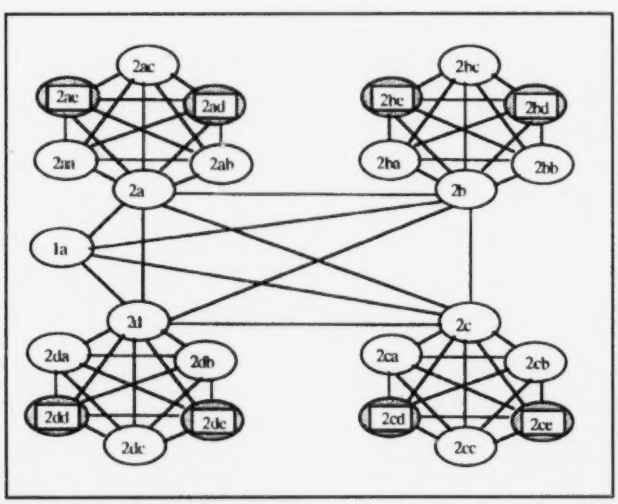

Figure 3. Guided unstructured design.

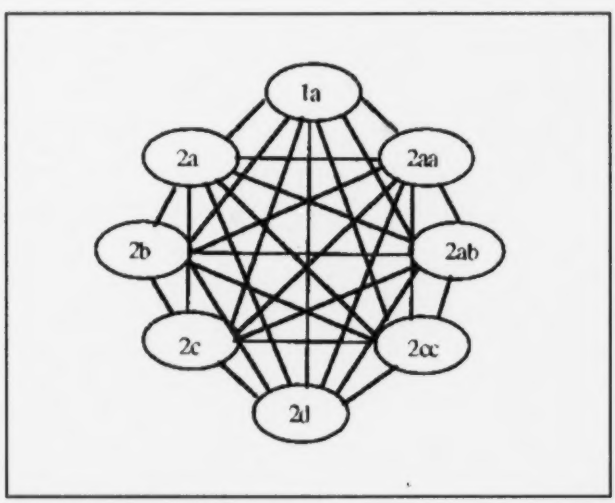

Figure 4. Unstructured design.

The Potential of Hypertext/Hypermedia in Instruction

Hypermedia/hypermedia provides great potential for learners. It provides them with immediate access to large collections of information through node-link networks. The access is often unlimited depending on how much information is built into the computer and the capacity of the computer to handle information. It also allows the learner to construct and expand the knowledge base. This collaboration and interactivity provides meaningful learning. But learners should be oriented to the node-link web in order to take full advantage of hypermedia/hypertext.

The access of information can be from many different locations or nodes rather than the traditional sequential/linear structures. The nonsequential structure gives great potentials for individualized learning. The goal of hypermedia is to provide an electronic environment to facilitate learning making use of all media attributes such as sound, animation, graphics, still pictures, motion pictures and text.

Conclusion

In the first part of the paper, the origin, definitions and concepts of hypertext/hypermedia was discussed. The second part dealt with designing hypertext instructional materials and the potential of hypertext/hypermedia in education and training. This new technology of instruction offers great potential in education as well as training because of designer-learner collaboration and its capability to incorporate audio, animation, graphics, motion pictures and text. It is and will be the technology of instruction in the next decade.

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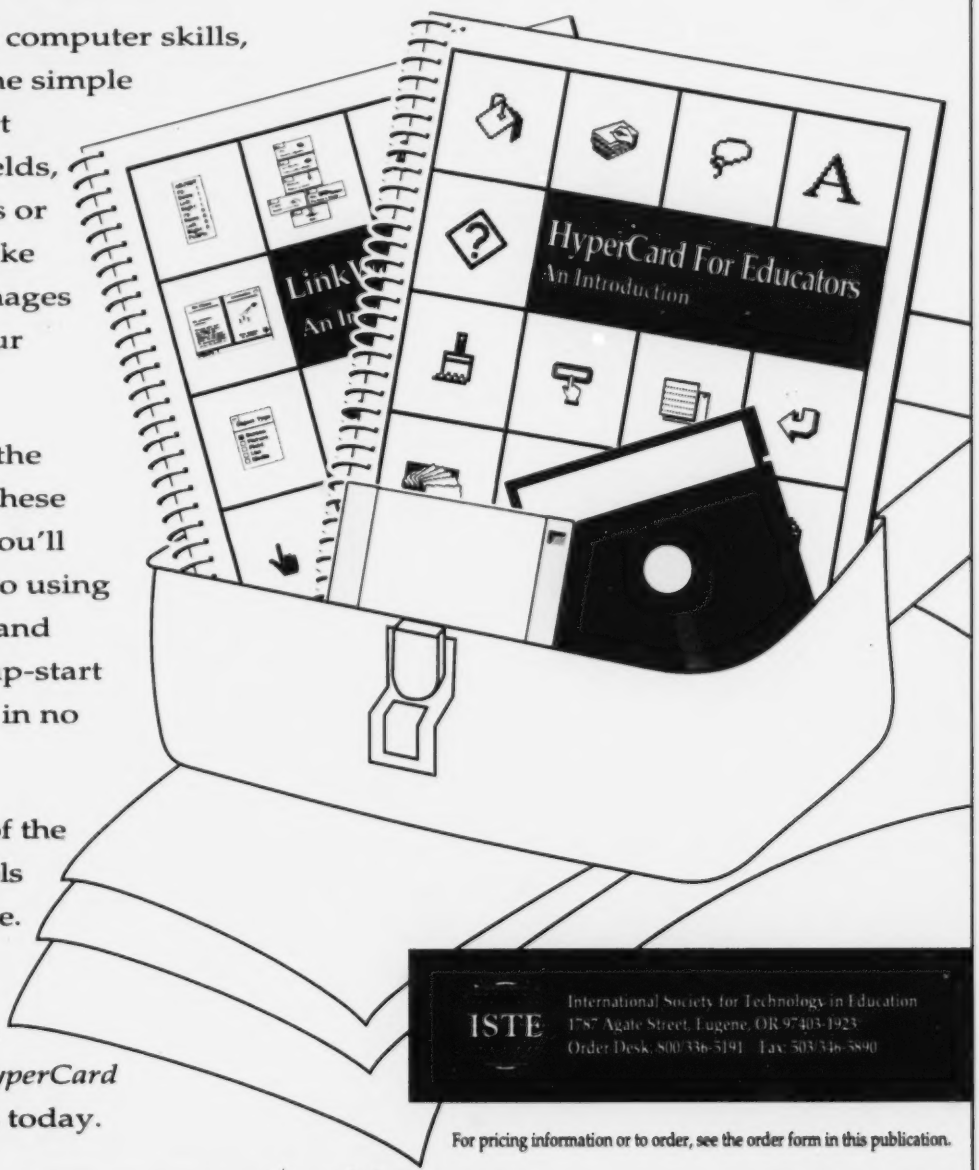

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HyperCard Cheat Sheet

Ann Barron

HyperCard Terminology

Button: Buttons initiate actions and link to cards, video, etc.

Card: Each screen in HyperCard is called a card.

Field: Fields are used to store and display text.

Home Card: A special stack which acts as an index.

HyperTalk: The HyperCard programming language.

Stack: A collection of cards make up a stack.

User Level: Constrains use of stacks. 1=Browse, 4=Script.

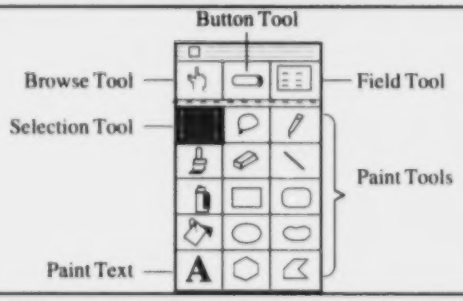
Helpful Hints and Keystrokes

⌘ **Space**	Show/Hide Menu Bar
⌘ **Option**	Show Buttons
⌘ **H**	Go to Home Card
⌘ **Q**	Quit HyperCard
⌘ **R**	See small pictures of Recent Cards
⌘ **M**	Show/Hide Message Box
⌘ **F**	Find Text

Creating a New Stack

1. Double-click on HyperCard program icon.
2. Choose **FILE** and select **NEW STACK.**
3. Type in name for the stack.
4. Click **NEW**.
5. Make sure the menu bar is showing (or Spacebar ⌘).
6. Access the message box (**GO** and **MESSAGE** or ⌘**M**.)
7. Type in **set UserLevel to 5** and press return.

Toolbox and Graphics



Making Fields

1. Choose FIELD tool (upper right of toolbox).
2. Choose **OBJECTS** menu and select **NEW FIELD.**
3. Double-click on the field that appears.
4. Set the style and other attributes.
5. Click **FONT** ... button for size, style, etc. Click **OK**.
6. Use arrow (cursor) to position and size field.
7. Choose BROWSE tool (hand icon) and click to enter text.

Making Buttons

1. Select BUTTON tool (top center of toolbox).
2. Choose **OBJECTS** menu and select **NEW BUTTON.**
3. Double-click on the button that appears.
4. Set the style and other attributes.
5. Click on the **LINKTO** ... button.
6. Go to destination card and click **THIS CARD**.
7. Use arrow (cursor) to position and size the button.

This "Cheat Sheet" is reprinted from a book by Ann Barron and Gary Orwig titled *New Technologies for Education*, Libraries Unlimited, P.O. Box 6633, Englewood, CO 80155-6633.

***Ann Barron**, University of South Florida, EDU 123H, 4202 Fowler Ave., Tampa, FL 33620.*

Quick Update

We're interested in your reaction to *HyperNEXUS*. We're planning new directions and want your input.

Check all that apply:

In which of the following areas are you involved with hypermedia/multimedia?

___ Preschool/Elementary Education
___ Middle School/High School Education
___ Higher Education
___ Other Adult Education
___ Training and Development: Business
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___ Multimedia Development

Would you rate yourself as a hypermedia/multimedia developer?

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___Intermediate
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Where are your primary interests related to hypermedia/multimedia?

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___Selector/Evaluate/Purchase
___Applications and ideas for my students/users
___Training people to integrate into their classrooms
___Training people to become developers
___Developer
___Researcher

Which computer systems do you use on a regular basis?

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Please write in the following information about the technology that you use:

What hypermedia/multimedia software and utilities do you use (i.e., *HyperCard, IBM LinkWay, Adobe Premiere, QuickTime*) regularly?

What other hypermedia/multimedia resources/peripherals do you use (i.e. CD-I, laserdiscs)?

What are your favorite hypermedia/multimedia books or other resources that have helped you learn more about these applications?

What types of articles do you read? Which do you prefer? What areas need to be expanded?

Read	Prefer	Expand	
____	____	____	Word from the Editor
____	____	____	Hardware/Software Update
____	____	____	Feature articles
____	____	____	Theoretical articles
____	____	____	Reviews of the literature
____	____	____	Research projects: Qualitative
____	____	____	Research projects: Quantitative
____	____	____	Design of instructional projects
____	____	____	Practical classroom applications: K-12
____	____	____	Practical classroom applications: Adults
____	____	____	Book Reviews
____	____	____	Multimedia/Hypermedia Reviews
____	____	____	Authoring Tool Tips for Use
____	____	____	Cheat Sheets
____	____	____	Did You Know? Column
____	____	____	HyperExchange

What are your ideas for expanding *HyperNEXUS*? What kinds of articles would you like to see?

Please list at least one idea or tip about hypermedia/multimedia you'd like to share.

P.S. Remember, we're looking for authors of all types of articles! Why not send a short article or idea along with your survey!?

Please return the survey as soon as possible. If possible, by December 15, 1993. If this issue gets buried and you don't send it until winter or spring, I'd still love to hear from you!

Send, fax, or E-mail your survey to the addresses below:

Annette Lamb, *HyperNEXUS Editor, The University of Toledo, 2801 W Bancroft SM 344, Toledo, Ohio 43606; Fax: 419/537-7719; E-mail: fac2327@uoft01.bitnet; alamb@uoft02.utoledo.edu.*

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Submit three copies of the manuscript, typed, double-spaced, and a copy on disk (Macintosh preferred—saved as an ASCII file, noting the computer brand and word processor used) to the publishing editor.

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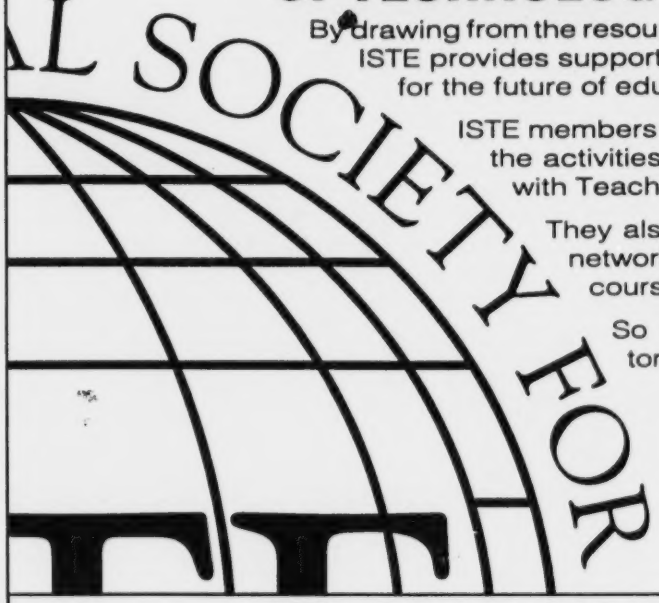

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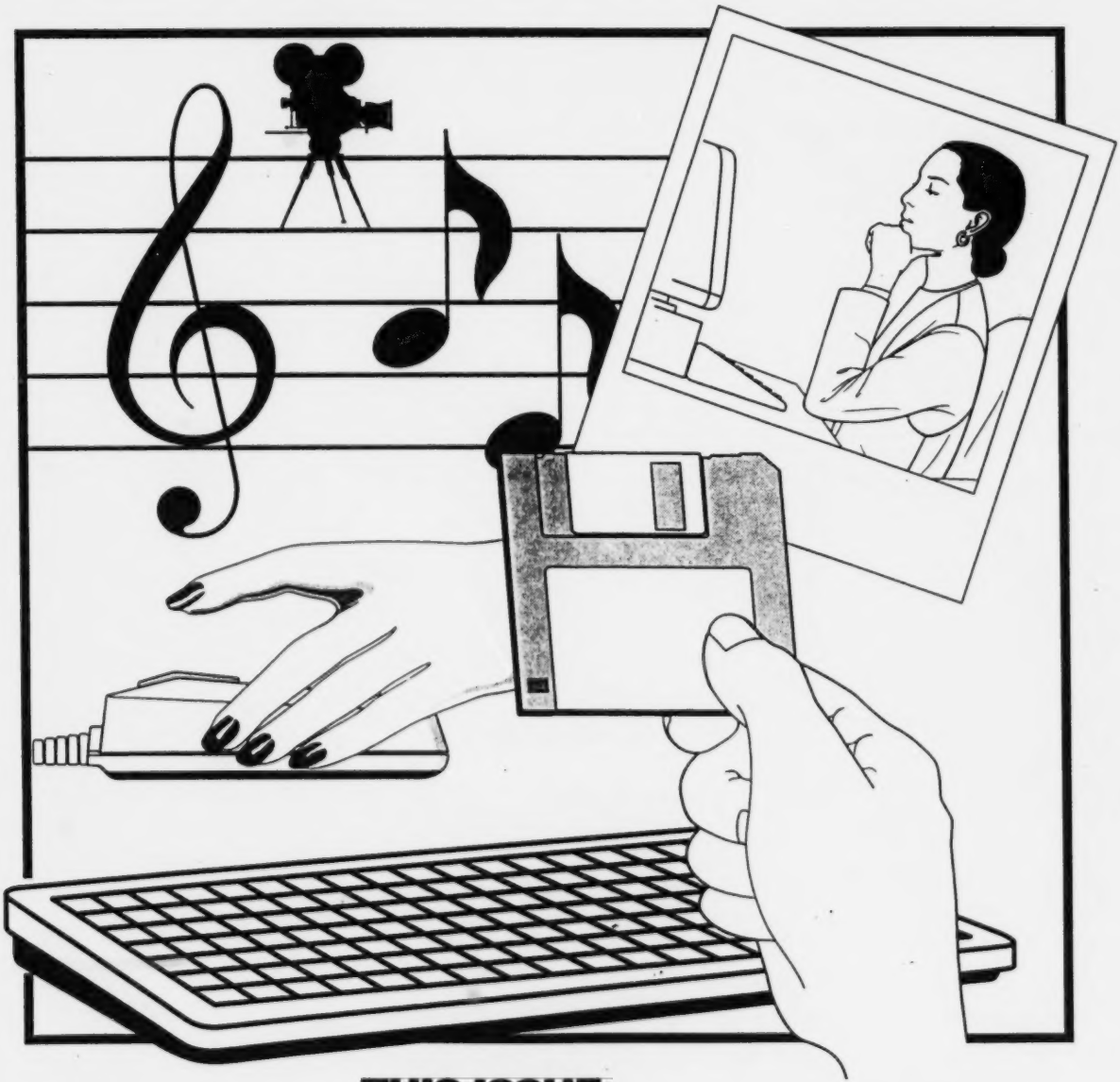
Volume 4, Number 2 Winter 1993



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HYPERCARD IN THE FOREIGN LANGUAGE CLASSROOM

VIRTUAL REALITY IN WYOMING SCHOOLS

HyperNEXUS Volume 4 Number 2

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A Word from the Editor

Annette Lamb

21st Century

Happy New Year! Just 10 years ago we were excited about Macs and mouses. Today we're talking about digitized video and virtual reality. Have you thought about how close we're getting to the 21st Century? You're the people that make today and tomorrow an exciting time. You'll notice in the Hardware and Software Update that all three new books were written by HyperSIG members. Many of the exciting new hypermedia and multimedia educational materials are also being created by our members every day.

The survey in the Fall issue had a deadline of Dec 15. I realize that many of you didn't receive the issue until that date, so we're extending the deadline. Please find the survey on page 25 of the Fall issue and complete it sometime soon. Feel free to send me a short E-mail message in response to the survey if it's more convenient. We're still very interested in your input. I'll wait until the Spring issue to post the results. In particular, I'm interested in notes and comments on projects you're involved with or short articles you might like to share.

Call for Help

We'd like to index *HyperNEXUS* from its beginning. Anyone interested in helping? It would make an interesting project for a graduate student. Let me know if you're interested. It would be a great way to make a contribution to the SIG!

Call for More Help

Last summer we were starting to get a good supply of articles. However with the hurricanes, floods, earthquakes, and sub-zero winter, I think people have been preoccupied. Please spend a few minutes thinking about all the positive things that have been happening during the last year. Did you or your students create a *HyperCard* stack or CD-ROM you'd like to share? Did your teachers and/or students produce a cross disciplinary *HyperStudio* project? Did you find a shortcut while creating a project in *LinkWay Live*? Do you have a fun story to tell about *Toolbook* or *Macromind Director*? Write it up and send it in. This is your journal, and I need your articles.

Even if you don't write an article, you can help. Whenever you see a good presentation at a state or national conference, suggest that the speaker write an article for *HyperNEXUS*.

Call for Even More Help

I've gotten calls and E-mail from people who've said, "I'd like to help, but I can't write an article. I'm a teacher, not an author!" Then, they go on to tell me about a fantastic project that they coordinated. Well, I've created a new column just for you. I'll kick the column off this issue with my own recent experience involving teaching a hypermedia workshop for foreign language teachers. The short "discussion" (don't worry, I won't call it an article) talks about what I did and shows some screen dumps. I'll call the column "Here's How It Went" until someone comes up with a better title. I can't wait to see your discussion. Send them to me on any format!

In This Issue

This issue begins with a short hardware and software update. Two articles from Kansas State University are featured in this issue. The lead article by Dr. Hilary McLellan focuses on some guideposts for educators interested in Virtual Reality. The second feature article is titled "Enhancing The *HyperCard* Authoring Environment by an Authoring Shell—Hyper+" and was written by Taishan Chang and Diane McGrath.

Three "In the Classroom" articles discuss practical projects. The article by George Culp discusses collaborative software development. John Snyder focuses on hooking teachers and students on hypermedia across subject areas. Finally, John Russell highlights a virtual reality project in Wyoming Schools.

This issue concludes with HyperExchange and the new column discussed earlier, titled "Here's How It Went."

In Conclusion

I'm looking forward to receiving your survey if you haven't already sent it. Forward it to me at the address below:

Annette Lamb, *The University of Toledo, 2801 W. Bancroft SM344, Toledo, Ohio 43606; E-mail: fac2327@uoft01.bitnet or alamb@uoft02.utoledo.edu.*

Hardware and Software Update

New Hypermedia Book

HyperMedia: A Review of the Literature and a Survey of Student Perceptions is a new book by Irene Smith. The book is based on Dr. Smith's dissertation and reflects her involvement and interest in hypermedia-based learning. It contains a wealth of useful information and is perfect for graduate students looking for research topics.

For more information, contact ISTE at 800/336-5191 or 503/46-4414; fax 503/346-5890. ISBN 1-56484-046-8.

New *HyperCard* Book

The Educator's Guide to HyperCard and HyperTalk is a new book by George H. Culp and G. Morgan Watkins from University of Texas at Austin. Through concise discussions, accessible examples, and its constructive lab activities, the book shows step-by-step how to design and develop a variety of *HyperCard* applications.

For more information, contact Simon & Schuster, Longwood Division, Allyn & Bacon, Tenth Street, Des Moines, IA 50309. ISBN 0-205-13921-3.

New Interactive Video Book

Using Interactive Video in Education is a new book by Penelope Semrau and Barbara A. Boyer from California State University, Los Angeles. This practical book details everything you need to know about interactive video in the classroom including uses and benefits, definitions, evaluation techniques, authoring tools, and creation of videodiscs from scratch. The book also contains a discount coupon for the *Voyager Video Toolkit*.

For more information, contact Allyn & Bacon. ISBN 0-205-15257-0.

Virtual Reality: Some Guideposts for Educators

Hilary McLellan

Virtual reality emerged from research in the fields of simulation, computer graphics, and human-computer interfaces in the mid-1980s. Since then it has received great attention from the media. Several movies have featured a virtual reality theme, including *Lawnmower Man*, *Total Recall*, *Toys*, and *Until the End of the World*. Recently a political cartoon showed President Clinton exploring foreign policy in an immersive "virtual unreality" system. A cascade of books and articles on virtual reality has appeared over the last year or so, reflecting wide-spread fascination. Virtual reality has generated a great deal of excitement, but it is an expensive proposition. A low-end professional virtual reality system starts at about $20,000. Far beyond the reach of most educators.... But there are some low cost alternatives to this, including "Through the window" VR (also called desktop VR) and "home-brew" virtual reality.

It is essential to realize that serious technical and conceptual issues still remain to be addressed before the potential of virtual reality can be realized. This technology is still at the "Kittyhawk" stage of development. And it is critical to understand that the current virtual reality technology is still very limited, due to technical constraints such as poor graphics resolution and insufficient computer memory. But the potential has many people excited. And every year, new applications are developed to take advantage of the technology — in entertainment, medicine, science, and other fields.

Through-the-Window Virtual Reality

There are two software programs that are accessible for the personal computer at a fairly low cost, permitting you and your students to visit virtual reality "through the window" of the computer screen. This includes designing your own virtual worlds and then exploring them. These two programs are (1) *Virtus Walkthrough*, and (2) *Life Forms*. With origins as a set planning tool in Hollywood, *Virtus Walkthrough* is an architectural design program that can be purchased for $250 with the educators' discount. *Virtus* has been used to plan the sets for a growing number of movies, including *The Firm*. *Life Forms* is a design tool for choreographers. *Life Forms* has been taken up by the legendary modern dance choreographer, Merce Cunningham (Schiphorst, 1992).

Home-Brew Virtual Reality

With home-brew virtual reality, the idea is to create your own low-cost immersive virtual reality system. For example, instead of one of the expensive professional instrumented gloves, it is possible to use a PowerGlove, sold as a toy for under $100, as an interface device. Some researchers are using the PowerGlove to create special gestural languages so that the deaf can communicate by converting gestures into words. (It's important to note that it is not possible to use the PowerGlove for American Sign Language — the PowerGlove doesn't have the necessary flexibility.) The July 1990 issue of *Byte* featured a short article on the PowerGlove and how it could be adapted for use on a personal computer. Suding (1993) describes how to create a head-mounted display for about $400. Additional home-brew resources are discussed in the book *Virtual Reality Creations* (Stampe, Roehl, & Eagan, 1993).

Setting the Stage for Virtual Reality in Education

Virtual reality did not just appear out of thin air. It is built upon existing traditions and media in computer science *and* education. For example, *Rocky's Boots*, a highly regarded program where learners explore the concepts of electricity, was developed in the early 1980s by Warren Robinett who went on to become one of the most respected programmers in virtual reality. *Rocky's Boots* is not three dimensional or immersive, but it features a sort of virtual world for exploration. It serves as a model for experiental VR learning environments today. And Logo, Seymour Papert's creation, can be viewed as a two-dimensional virtual world, the world of turtle graphics. Some of the key theorists and developers in virtual reality worked with Alan Kay, one of the most visionary thinkers about computers and education, at the Atari Lab during the early 1980s. This includes Brenda Laurel, who is one of the leading theorists in virtual reality. She has proposed a model of computers-as-theater, the design of human-computer interactions in accordance with the principles of drama (Laurel, 1991).

If you want to give students a sense of how virtual reality can be applied, there are multimedia resources that point the way. One outstanding resource is *The Great Solar System Rescue*, a multimedia package for cooperative learning from the Tom Snyder Software Company. This program, featuring videodisc and computer program, gives young learners a hint of the virtual planetary exploration research and development underway at the NASA Ames Lab in California (McGreevy, 1993). *The Great Solar System Rescue* uses photographic imagery from Voyager and other space probes to present a set of scientific detective stories, where learners play the roles of geologist, meteorologist, astronomer, and space historian, to find lost space probes.

Over the past few years, researchers at the Human Interface Technology Lab at the University of Washington, a leading center of VR research and development, have carried out projects where children designed and explored virtual worlds. This fascinating research is reported in Bricken and Byrne (1993). Regian, Shebilske, and Monk (1992) have conducted research to study the effectiveness of virtual reality as a training tool for training people how to work in complex, high technology environments. Researchers at the Marshall Space Center in Alabama are planning to conduct research to study how children respond to virtual worlds. The necessary educational research to assess the educational use of VR is only now beginning to be conceptualized and carried out.

Recently, in October 1993, a virtual reality art exhibit was held at the Guggenheim Museum in New York. Previously during the summer of 1992, there was a similar exhibition at the Banff Center for the Arts in Canada. Some in the virtual reality R&D community have made VR

technology available to artists to see what this group will do with this new creative medium.

Virtual Reality and Special Education

One of the most promising areas for virtual reality applications in education is in special education and rehabilitation. Last June, the first annual Conference on Virtual Reality and Persons with Disabilities was held in San Francisco. This wonderful event will be repeated in June 1994. For information about this conference, contact Dr. Harry Murphy, California State University Northridge, 18111 Nordhoff Street—DVSS, Northridge, CA 91330. Phone: 818/885-2578. FAX: 818/885-4929. It may be possible to obtain a Proceedings of the papers from the 1993 conference.

One example of virtual reality and special education comes from researchers at the Loma Linda Medical Center Children's Hospital in southern California who are exploring different virtual reality applications for the rehabilitation of children and educationally challenged adults. This includes gestural interfaces such as a talking glove for the speaking and hearing impaired (like the PowerGlove application described above) and real-time performance animations by "Virtual Actors" based around the character "Eggwardo," which was developed by computer animators at Mark Sorell & Associates in Los Angeles, working with neuroscientist Dave Warner. Tice & Jacobson (1992) explain: "We brought Eggwardo into the hospital where he interacted with children who were terminally ill. Some kids couldn't even leave their beds so Eggwardo's image was sent to the TV monitors above their beds, while they talked to the actor over the phone and watched and listened as Eggwardo joked with them and asked how they were feeling and if they'd taken their medicine. The idea is to use Eggwardo, and others like him, to help communicate with therapy patients and mitigate the fears of children who face surgery and other daunting medical procedures." (p.284) This type of Virtual Actor application is a form of digital puppetry involving real-time computer animation. The puppeteer wears an electronic face mask that contains sensitive monitors recording the slightest movement of mouth, chin, cheeks, eyes, etc. When the puppeteer smiles, so does the animated character on the screen; when the puppeteer talks, so does the animated character, including both facial movements and spoken words.

Virtual Reality Entertainment Options

So you just have this urge to try out a virtual reality entertainment experience? Your options are growing all the time. The Luxor virtual reality theater, designed by Hollywood special effects wizard Douglas Trumbull, just opened in Las Vegas. Another option is the BattleTech Center in Chicago (there's also one in Tokyo).

The immersive Virtuality games such as Dactyl Nightmare can be found at arcades across the country. To find out the location nearest you, contact the Edison Brothers in St. Louis. This company imports the Virtuality games from the British company W. Industries. Since Edison Brothers is based in St. Louis, you can be sure that this is a town where you can find virtual reality games. Virtual reality features can be found in several museums—for example, in the National Hockey Museum and the Boston Computer Museum.

Virtual Reality Reading List

The best resource for information on virtual reality is the catalog from Media Magic, a friendly mail order company that features books, journals, software, and videotapes on the subjects of virtual reality and scientific visualization. Address: Media Magic, Nicasio, California 94946; ph. 415/662-2426. Other resources include:

Aukstalnis, S., & Blatner, D. (1992). *Silicone mirage: The art and science of virtual reality*. Berkeley, CA: Peachpit Press.

Bricken, M., & Byrne, C. (1993). Summer students in virtual reality: A pilot study on educational applications of virtual reality technology. In Alan Wexelblat (Ed.). *Virtual reality: Applications and explorations*. pp. 199-217.

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Enhancing the HyperCard Authoring Environment by an Authoring Shell—Hyper+

Taishan Chang and
Diane McGrath

Abstract

HyperCard is a general development tool with limited authoring capabilities. While it allows an inexperienced user to produce a basic presentation of knowledge quickly and easily, creating a CAI for individualized learning with *HyperCard* requires programming skills. The Hyper+ authoring shell, which adds the CAI capabilities lacking in *HyperCard*, was developed based on sound instructional design principles and formative evaluation techniques to facilitate CAI program production and to reduce the development time required. This paper summarizes work completed so far in building Hyper+ authoring shell to enhance the authoring environment of *HyperCard*.

Introduction

HyperCard is a general development tool for Macintosh material. It benefits from the Macintosh computer's user-friendly interface and multimedia capabilities which seems to make it an appropriate medium for computer-assisted instruction (CAI). *HyperCard* is bundled with each Macintosh computer sold since it was introduced in 1987 by Apple Computer, Inc. In 1992, a survey by the National Center for Educational Statistics showed that the Macintosh was the most-used computer in classroom. Because of its easy to use interface and general availability in the educational settings, *HyperCard* has gained a new, wide range of CAI developers. In turn, CAI design and production have increasingly become tasks of classroom instructors rather than trained instructional designers (McCormick, 1991). *HyperCard* has powerful graphic, browsing, and hypertext tools that allow nonprogrammer *HyperCard*-based CAI producers to quickly develop courseware aimed at basic presentation of knowledge. However, to use *HyperCard* to create courseware for individualized instruction, which usually involves sophisticated CAI activities such as answer analysis, testing, and branching, programming skills and instructional design experience are necessary. Since school teachers generally lack the programming experience or simply do not have time to program, its very difficult for them to produce high quality, interactive courseware by using *HyperCard*. According to Brown (1990,) instructional materials written by those not thoroughly familiar with programming rarely make full use of the capabilities of either the Macintosh computer or the *HyperCard* program. HyperTalk, the programming language of *HyperCard*, is powerful enough to allow one to write advanced instructional courseware. However, to learn to use this object-oriented language is still somewhat complex and time-consuming. While there are other software packages available to nonprogrammer school teachers to develop CAI materials, none is as widely used as *HyperCard* (Cook, 1990; Boone & Higgins, 1991).

Considering the strengths and weaknesses of *HyperCard*, an authoring shell—Hyper+ was developed to enhance *HyperCard*'s authoring environment. Hyper+, which adds the CAI capabilities lacking in *HyperCard*, is designed and developed to allow nonprogrammer *HyperCard*-based CAI producers to develop quality, interactive courseware without requiring programming. Moreover, Hyper+ provides experienced CAI producers with a better authoring environment to produce courseware easily and quickly.

The purpose of this study was to design and develop a user-friendly authoring shell based on sound instructional design principles and formative evaluation techniques to enhance *HyperCard*'s authoring environment, in turn, to facilitate CAI programs production and reduce the development time required. The many *HyperCard* users would thus be able to use sophisticated CAI techniques easily without having to learn a

Figure 1. Events of Instruction Used in CAI Strategies

Events of Instruction	Instructional Strategies			
	Drill and Practice	Tutorial	Simulation	Test
Gaining Attention	—	—		
Informing the Learner of the Objectives		—	—	
Stimulating Recall of Prerequisite Skills		—		—
Presenting the Stimulus Material		—	—	
Providing Learning Guidance		—	—	
Eliciting Performance	—	—	—	—
Providing Feedback	—	—	—	—
Assessing Performance		—		—
Enhancing Retention and Transfer		—		

Adapted from Gagne, Briggs, and Wagner, 1992

computer language and without giving up the flexibility provide by a high-level programming language—HyperTalk.

HyperCard's Authoring Capabilities

The first step toward the design of an authoring shell to enhance the authoring environment of *HyperCard* is to locate the weaknesses of *HyperCard* through identifying the events of instruction that are usually included in each type of CAI strategy (see Figure 1) and the possible alternative methods implementable by the computer (see Figure 2). Gagne's nine events of instruction are suitable organizing elements for the delivery of CAI (Andrews & Goodson, 1980; Smith & Boyce, 1984; Chen & Shen, 1991). This sequence of events, according to Gagne (Gagne, Briggs, & Wager, 1992), supports the internal cognitive processes necessary for learning. Once the process of comparing *HyperCard's* authoring capabilities to alternative computer methods (see Figure 3) and other major authoring systems' authoring capabilities (see Figure 4) is completed, the authoring facilities required to implement courseware creation, but missing in *HyperCard*, are also identified. The authoring capabilities which are weak or missing in *HyperCard* are described in the following:

1. *HyperCard*'s textual, graphic, hypertext, and browsing tools are particularly useful authoring capabilities for courseware development, but programming is necessary if testing is to be included in the courseware. Answer processing, test generating, grading, and lesson branching are CAI functions which *HyperCard* does not support.
2. CAI management capabilities such as recording, reporting, and printing are limited in *HyperCard*. Individual cards and simple reports can be printed, but sophisticated reports or reports based on data selected according to search criteria (for example, students' learning path) are not supported by *HyperCard*.
3. To display, edit, and control a piece of video image with *HyperCard*, a third-party program must be called in.
4. By its nature, *HyperCard* grants the user almost unlimited access to the cards in a stack. That is likely to be viewed as the preferred approach to delivering instruction by cognitive psychologists (Bonner, 1988). However, Jonassen (1986) cites a series of studies that show that "the case of learner control of instruction, which requires self-determination, autonomy, and responsibility, simply has not been empirically, supported." Hannafin (1984) and Steinberg (1989) point out that the issue should be thought of as a continuum ranging from instruction that is sequenced completely by the learner (learner

Figure 1 : CAI Alternatives for Events of Instruction

Events of Instruction	CAI Alternatives
Gaining Attention	Text, graphics, animation,and sounds
Informing the Learner of the Objectives	Text, graphics, testing(pretest), and demonstration
Stimulating Recall of Prerequisite Skills	Testing, branching, text,graphics, and locus of control
Presenting the Stimulus Materials	Textual, graphic, sounds, videodisc, learner controlled speed and options for review
Providing Learning Guidance	Textual, graphics, animation, sound, help sequence
Eliciting Performance	Testing (various question types), response analysis, text, graphics
Providing Feedback	Counter (multiple chances), graphics, timed (timed response), system cues, help sequence, branching (for review)
Assessing Performance	Testing, record keeping, grading, summary reporting
Enhancing Retention and Transfer	Branching (conditional iterative, and linear), text, graphic

Adapted from Smith and Boyce, 1984

control) to instruction that is sequenced completely by the delivery system (program control). They note that characteristics of both the learners and the material to be presented contribute to determining whether greater learner control or greater program control is likely to be the more effective. The essence of the issue is that the courseware designer needs to use judgment to determine the best mix of learner and program control for a particular situation. The function which facilitates the courseware developers to implement the locus of control is not supported by *HyperCard*.

5. Because *HyperCard* is so easy to use, developers can be seduced into working with it as a design tool. As the preliminary design emerges as a working stack, the developer may view it not as a design or formative document, but instead as the final product. In other words, when developers preview a prototype stack, it is likely to look so good and work so well that they perceive the project as

Figure 3. HyperCard's Authoring Capabilities vs. CAI Alternatives for Instructional Events

Suitable CAI Techniques for Instructional Events	*Hypercard* is Able to do
text	•
line-art	•
bit-mapped graphics	•
sound	•
hypertext structure	•
animation	•
videodisc editing	—
test generating (e.g. T/F, multiple choices, & short answer)	—
answer analysis (e.g. exact, keyword match, & numeric range)	—
timed response (e.g. # of tries allowed or timed limit)	—
recordkeeping	—
student mastery tracking	—
reports	—
grading	—
printouts of summaries, and evaluations	—
courseware validation, and debugging	—
locus control options (e.g. learner, program, & combined)	—
feedback (correction)	—
makes prescrips based on performance	—
branching (in conditional, iterative, & linear)	—
sequence control option (e.g. fixed or free order)	—
system integrated tools	—
roster management	—

"•" *HyperCard* with the capability (without requiring programmingor calling third-party program).
"—" *HyperCard* without the capability (programming required).

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nearly complete when it is actually just getting started. A debugging or testing-revising function, which allows developers to try out and modify a course under development in its entirety before students use it, is not supported by *HyperCard*.

6. Within *HyperCard*, the structure of a stack should mirror the structure of the content to be presented if the user will be able to navigate freely through the stack. *HyperCard* does not have a facility which allows courseware developers to build and review course structure quickly and easily, allow a teacher to do a thorough front-end analysis of the content before developing a course (stack), and allow the developer to move about within the course and access to all parts of the course quickly.

The Design of Hyper+

The purpose of this research was to develop a *HyperCard* authoring shell—Hyper+, based on Gagne's instructional design model and formative evaluation technique to facilitate nonprogrammer school teachers production of CAI materials and to reduce the development time required. The design process of Hyper+ was governed by two principles: programming is not required, and it is easy to use. An analysis of the results of

Figure 4. CAI Capabilities of Major Authoring Systems for Macintosh Computers

Authoring Capabilities	Authoring Systems					
	Authorware Professional	Course Builder	Guide	Lesson-Card	MacVideo	HyperCard
variety of fonts and sizes	•	•	•	•	•	•
variable styles and formats	•	•	•	•	•	•
able to import text	•	•	•	•	•	•
variety of objects (line, box, etc.)	•	•	—	•	•	•
animation options	•	•	—	•	—	•
able to scale and rotate graphics	•	•	•	•	•	•
use of bit mapped graphics	•	•	•	•	•	•
able to overlay graphics or text	•	•	•	•	•	•
able to import graphics	•	•	•	•	•	•
able to generate computer sound	•	•	•	•	•	•
to generate synthesized speech	•	•	—	—	—	—
able to control videodisc player	—	—	—	—	—	—
able to control CD player	—	—	—	—	—	—
use of variety of question types	•	•	—	•	—	—
use variety of answer matching	•	•	—	•	—	—
use multiple correct answers	—	—	—	—	—	—
generate individualized feedback	•	•	—	•	—	—
random generation of questions	•	—	—	—	—	—
able to branch based on scores	•	•	—	•	—	—
branching conditionally & iteratively	•	•	•	—	—	—
allow learner control	—	—	—	—	—	—
program control	•	•	•	•	•	•
combined (learner/program) control	—	—	—	—	—	—
store elapsed time & student scores	•	•	—	•	•	—
store learning path	•	—	—	—	—	—
generate student report	•	•	—	•	•	—
generate course report	•	•	—	—	—	—
course debugging/validation	•	—	—	—	—	—
integrated flowcharting	•	•	—	—	—	—
online & offline help	•	•	•	•	•	•

"•" Program with the capability (without requiring programming or calling third-party program).
"—" Program without the capability (programming required).

comparison among the existing *HyperCard*'s authoring capabilities, the CAI techniques required for implement courseware creation (see Figure 3), and the authoring capabilities of other major authoring systems (see Figure 4) has identified 13 desired features to be included in Hyper+ authoring shell. These authoring features, after a combining and refining processes, have been implemented and incorporated into the Hyper+ authoring shell to enhance *HyperCard*'s authoring environment. Hyper+ is intend to provide nonprogrammer teachers with the capability to create, edit, import, test, run, and manage each card of a CAI course without requiring programming. All information about a course throughout its life cycle can be stored in a database under full configuration control. The schema of Hyper+ appears in Figure 5. Hyper+'s architecture, the major modules, the individual authoring feature, and the courseware development process with Hyper+ are described as follows:

Architecture of Hyper+

The Hyper+ authoring shell is comprised of three modules: the authoring module, used by the teacher to build a course; the help module, used by both the student and teacher to obtain necessary information about the course; and the management module, used by both teacher and student to get reports and printouts about the course.

Course, the largest instructional unit in Hyper+, is made up of topics (one course can hold up to 10 topics). Topics are in turn made up of two types of cards, called information cards and test cards (each topic can have an unlimited number of cards). Information cards consist only of information to be displayed to the student. Test cards solicit, recognize, and respond to student input.

All the CAI facilities in Hyper+ are accessed through menu and icon buttons, which are context sensitive. The Hyper+ authoring shell is written in HyperTalk to run on any model of Macintosh computer with *HyperCard*. Since Hyper+ is built on *HyperCard* to enhance authoring productivity of *HyperCard*, no original *HyperCard* performance has been traded off.

Authoring Capabilities of Hyper+

Authoring Environment Integration. With the system integrated Outliner, Hyper+ makes it possible to develop courseware through building a flow chart outline. Outliner is an outline processor that allows the teacher to

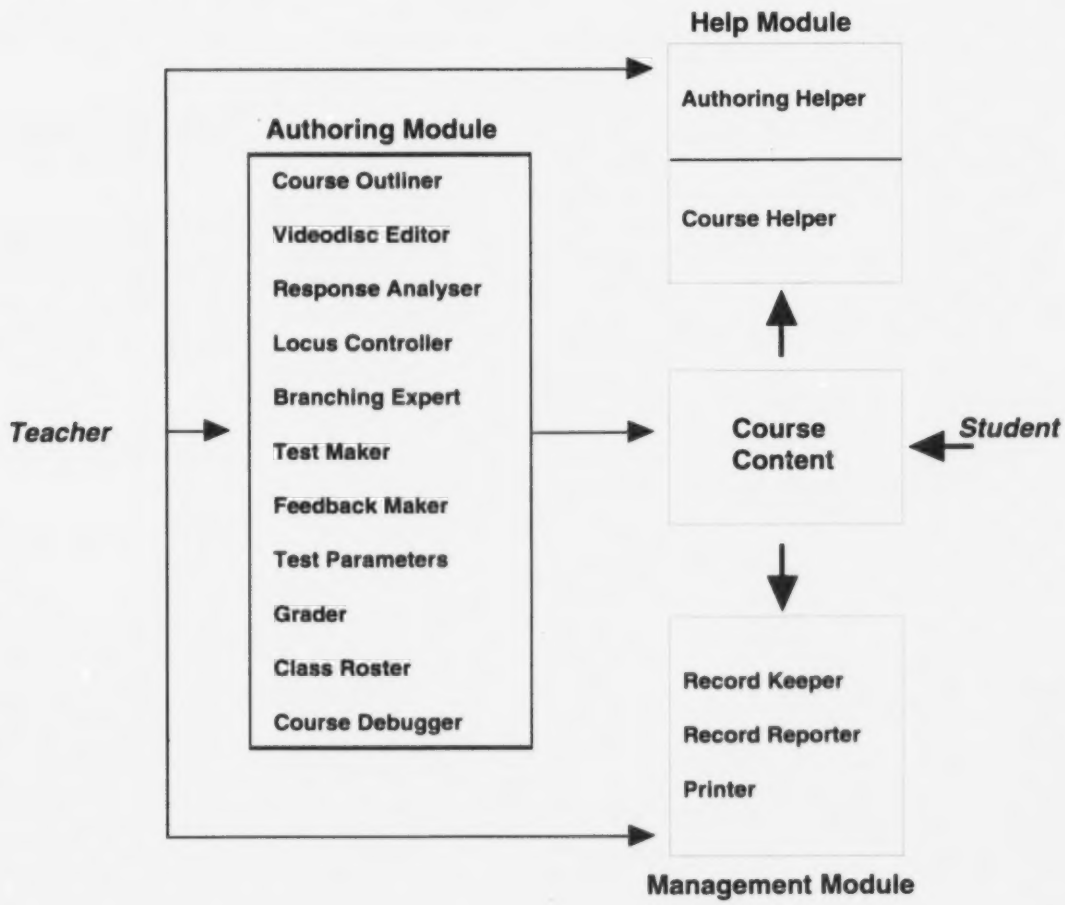

Figure 5. Hyper+ Architecture and Modules.

design or storyboard the instructional units within *HyperCard*. In addition to outlining the logic and sequence of the course outlined, the teacher would be able to design and edit the individual cards (frames) with Outliner. Hyper+'s Outliner allows the teacher to build and review course structure easily; to access all parts of the course quickly; and to form documentation of the curricular and technical aspects of the course correctly.

Videodisc Editing. With the built-in videodisc editor, Hyper+ allows the teacher to control an external videodisc player directly. Motion or still video image and overlay text can be added to any part of a course simply by typing and button clicking.

Answer Judgment. The answer judging capabilities in Hyper+ include String Exact, Numeric Exact, Numeric Range, All-Keyword, and Any-Keyword. String or Numeric Exact matches the word, the string word, and the number answer. Numeric Range looks for the number which fits in certain range. All-Keyword considers a test answer to be correct only if all of the key words anticipated by the author are found in the student answer. Any-Keyword considers a test answer to be correct whenever any key word anticipated by author is found in the student answer.

Record Keeping/Reporting. Hyper+'s Recordbook calculates, records and reports the following: the percentage difficulty of each test question (error rate on an question item), the student's answer to each question, the elapsed time for the entire course and individual cards, student's comments to teacher, student's test scores, start and finish time of each topic and the whole course, the state of each topic (completed or uncompleted), the number of tries on each topic, and the class roster. Recordbook keeps separate records for information topics, test topics, and individual student's learning path. The Recordbook may be sorted to arrange students either alphabetically or by grade. The various course reports may be viewed for the entire class or for an individual student.

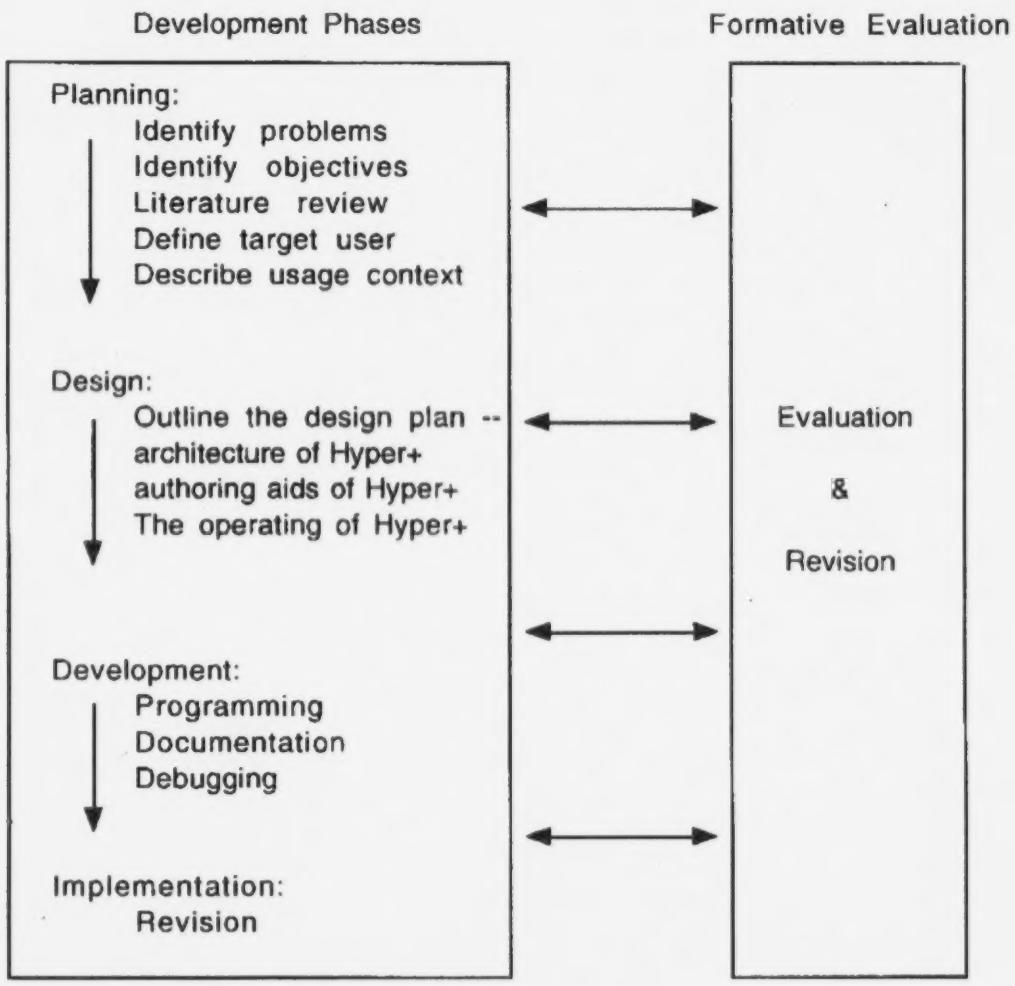

Figure 6. Research and Development Model for Hyper+.

Hyper+ allows students to make comments to the teacher. The purpose of this is twofold. First, it enables information to be gathered about the content of the course or the functioning of the design of the course. Such information is invaluable for the continued improvement of the course. Second, it provides the student with an outlet to express irritation or frustration about the course.

Printing. Individual course reports can be printed out for each student detailing grades and further study suggestions. Performance reports for a whole class, which details each student's performance on every topic, also can be printed out. In addition, Hyper+ allows the teacher to print out the content of the whole course, individual topics or cards.

Locus of Control. Hyper+ provides the teacher with options to set a course to Program Control, Student Control, or Combined Control. Under the Student Control option, the students are allowed to determine which topics will be covered and the sequence to be followed. Hyper+ will use students' test results and the branching criteria provided by the teacher to diagnose each student's needs and prescribe the sequence and amount of study. The student then decides to accept or ignore the advice. Under the Program Control Hyper+ will use students' test results and the branching criteria provided by the teacher to diagnose each student's needs and prescribe which topic should be covered and the sequence to be followed. The student then must follow the advice to continue the course. Under the Combined Control Hyper+ will use students' test results and the branching criteria provided by teacher to determine to shift the control of the course to student or program.

Branching. By choosing Hyper+'s Branching Expert function, the teacher is prompted to enter the mastery score, non-mastery score ranges, and suggested destinations for each test topic. Based on these criteria and student's test result Hyper+ then determines which part of the course is best for a student at any given time. Hyper+ is capable of conditional, iterative, and linear branching.

Test Generating. Test Generator provides three types of test templates: True/False, Multiple Choice, and Short Answer questions. A multiple choice test item can have 3, 4, or 5 choices, and multiple correct answers option is available. By using Hyper+'s test generating function, the only thing the teacher need to do is typing in the questions and answers.

Feedback. Each test template in Hyper+ provides a set of routines that allows the author to produce individual feedback for each question and each answer choice. Two kinds of feedback are available: Whole Question feedback, used in true/false and short answer questions; Answer Choice feedback, used in multiple choice questions.

Test Parameters. Hyper+ provides a series of teacher-supplied test options such as taking test in fixed or free order, time limit of a test, number of tries allowed for a question, reveal or not reveal answer to a test question, grading a test question immediately or after the whole the test is done. With Hyper+, if a test topic is set to be graded as soon as a test question is answered, the test terminates automatically after the last question. When the student can move between questions at will during the test, or can choose not to answer questions when first presented, the student has to decide when to terminate the exam. If the test topic has a time limit or try limit, it must obviously be terminated when this limit is reached.

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Grading. Hyper+'s Grader computes class averages for a test topic, converts raw scores to percentages and letter grades. Although each test topic has a default total points —100, the teacher is allowed to assign differing weights to individual test topic by changing the default grading scale.

Class Roster. This function helps teacher ensure that only authorized student take the course. Hyper+ is designed to check that the correct course is given to the student whose name is typed into the system. Thus, to enter a course, a student typed in his or her name or identification number. The Hyper+ then checks this against a roster previously entered and administers the correct course. A course under Hyper+ allows for an unlimited number of classes, and a class may have an unlimited number of students. To add or delete a class or a student, the teacher simply clicks on Add or Delete buttons.

Course Validation/Debugging. Hyper+ helps the author to locate errors, both content and logical, in two ways. First, Hyper+ allows the teacher to try out and modify a course under development in its entirety before students use it by allowing teachers to switch between Teacher Mode and Student Mode. This modes switching is carried out by the login-password, which must be keyed by the teacher to prevent unauthorized course modifying. Second, a built in error checker examines the courseware thoroughly and reports findings (e.g., empty branches, orphaned cards—not linked to topic, empty topics, empty class roster, and missing answer questions) automatically whenever the teacher indicates that a course is ready to be used by students. These features ensure the teacher that all aspects of the course are working properly.

The Courseware Development Process

To produce pedagogically sound CAI materials, and to save time and effort on possible later courseware correction, the Hyper+ authoring shell user is asked to conduct an instructional analysis at the beginning of the courseware development. The Hyper+ user is prompted to do an instructional analysis by identifying the topics (subskills) of a course and organizing them into the CourseOutline. According to the content of the CourseOutline, the user is then asked to create the content cards of a specific topic, to prepare the instructional content for individual cards, and to sequence the content cards into the TopicOutline. Once the content cards of each topic of the course are developed, the integration of all the topics into a coherent course to facilitate individualized instruction begins. The Hyper+ user may use Branching Expert and Test Parameters Setter authoring aids to specify rules, learning conditions, and mastery criteria of each topic which will be later used by the Hyper+ to perform various functions for individualized instruction. Hyper+, based on the rules provided, will use the facts (the sequence of the identified topics and the student's performance data) and their relationships to the sequence of the course to set up the entry points, and to determine the learning path to meet an individual's learning needs.

Conclusion

The purpose of this research was to develop a *HyperCard* authoring shell—Hyper+, based on Gagne's instructional design model and formative evaluation technique to facilitate nonprogrammer school teachers on CAI materials production and to reduce the development time required. Earlier Hyper+ has completed its initial evaluation, HyperSIG Leadership which done by acknowledged experts in CAI field. The results of the evaluation indicated that experts rate Hyper+ very easy to use, and they comment that it reduces planning time. The results also showed that experts believe Hyper+'s main strength is improving the quality of *HyperCard*-based courseware without requiring programming. Currently, a group of school teachers are invited to try out the Hyper+ and response to the questionnaire. The evaluation-revision cycle will continue until the best possible level of performance is reached.

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In The Classroom:

An Approach to Collaborative Software Development

George H. Culp

Abstract

Teachers and administrators at two Austin, Texas area elementary schools, working with graduate student research assistants and faculty at The University of Texas at Austin, collaborated on the design and development of a series of *HyperCard* stacks for elementary school use. The underlying principle of the collaborative project was that the stacks were designed by teachers to meet needs defined by teachers. Participation in the Christopher Columbus Consortium, sponsored by Apple Computer, Inc., and support from the Texas Center for Educational Technology (TCET) assisted in carrying out the project. Twenty-seven stacks were completed from February 1991 through August 1992 and are available at nominal cost from TCET.

Positive outcomes from the project include new channels of communication and collaboration between the participants, increased integration of technology into the schools, increased interest in research in educational technology, and continued collaborative development of instructional materials.

Background

The University of Texas at Austin, Highland Park Elementary School in the Austin Independent School District (ISD), and Valley View Elementary School in the suburban Eanes ISD, are participating members in the Christopher Columbus Consortium, sponsored by Apple Computer, Inc. The consortium currently has over 75 partnership sites made up of universities and colleges and K-12 schools exploring new methods, techniques, and strategies in educational technology. In the summer and fall of 1990, I began a series of hands-on workshops introducing *HyperCard* to teachers at the two local elementary schools. The teachers consistently showed a high interest in the multimedia capabilities and the educational potential of *HyperCard*, and many had an interest in developing materials relevant to their needs. However, all stated that finding the time for such development would be very difficult, given the constraints already in place in their daily schedules.

As part of my duties at the University, I teach a graduate course, *HyperCard in Instruction*, for graduate students in Instructional Technology. The course includes the requirement that each student design and develop a semester project using *HyperCard*. The specific content of the project is at the discretion of the students, and I have found that they can be extremely creative and self-reliant. However, in the fall of 1990 when we were working with the elementary school teachers in the consortium, a few students asked if I could suggest some topics for their projects. Their timing was opportune because there was a wealth of ideas for "semester projects" from the teachers at the elementary schools. Shortly thereafter, I arranged for the students and teachers to get together to discuss and outline their interests. By the end of the semester, five *HyperCard* stacks designed by teachers and developed by students were completed. While the stacks did not meet all the requirements to be of commercial quality, they nonetheless were highly successful in meeting the objectives for both the designer-teachers and developer-students. It was definitely a win-win situation.

Also during this time the University became a participating member of the Texas Center for Educational Technology (TCET). The center, established by legislative statute in June 1990, is located at the University of North Texas in Denton, with supporting sites at the University of Texas at Austin and the University of Houston at Clear Lake. In mid-year an opportunity arose to make a more formal process of the collaborative software design and development that had been initiated informally in my class. Following a proposal to the center, funds were provided to support teachers and graduate students in a Collaborative Software Development Project.

Two teachers at each school were each paid $500.00 per semester as consultants to provide the objectives, content, and sequence for the stacks. Graduate students in Instructional Technology were paid $8.00-10.00 per hour as research assistants to develop the stacks and to provide assistance with design as needed.

Design and Development Aspects

A very basic systematic approach was followed for design and development. For the purposes of the project, the approach and responsibilities were defined as:

- Define the content and objectives: (Teachers)
- Outline the instructional sequence: (Teachers)
- Develop the stacks: (Research assistants)
- Pilot test the stacks: (Research assistants and teachers work together. Research assistants get "over-the-shoulder" feedback from the teachers regarding design and presentation.)
- Revise stacks based upon teacher feedback: (Research Assistants)
- Review stacks: (Research assistants and teachers together. Further revision as needed.)

The first two steps were essentially a paper and pencil process where the teachers provided a storyboard, graphics, and information for any sound or video sequences for the stack. Using this information, the research assistants developed the stack. Review and revision with the teacher then followed. Although this approach to design and development was basic and built around a small and informal team, it proved to be very successful.

Accomplishments

From February 1991 through August 1992, the collaborative software development project completed 27 stacks, which are listed at the end of this article. The underlying principle of the collaborative project was that

the stacks were *designed by teachers* to meet needs *defined by teachers*. This resulted in a wide variety of topics for the stacks, ranging from an audible alphabet to incorporating videodisc and CD-ROM materials for enriched multimedia teaching and learning strategies. Use of the stacks also varied and included teacher presentation with class discussion, peer group, and individual student interactions. Because the teachers were intimately involved in the design of the materials, integration of the stacks into the curriculum was a natural and easy process.

Three of the stacks, *Fiddlesticks!*, *Science Around Us*, and *Trumpet of the Swan*, won two first place awards and one third place award, respectively, in national contests sponsored by the Christopher Columbus Consortium.

Dissemination of the stacks to other teachers throughout the state was an important goal of the project. The availability of 17 stacks at a nominal cost (usually $5.00) was announced in the fall 1991 issue of the TCET newsletter. Although the project was approximately 60% complete at that time, over 100 stacks were distributed. The award winning stacks listed above are available also from the Christopher Columbus Consortium.

Conclusion

Several positive outcomes have resulted from the project and the partnership of the schools. New channels of communication and collaboration have been opened between all members. The inservice teachers greatly appreciate being able to state in their own terms the design of stacks to meet their needs, as they know them, rather than needs as perceived by others outside the classroom. Interest has increased in the research components of technology in education, which has facilitated cooperative studies within the partnership. Motivation is high for using educational technology, and it is being integrated in the schools with the teachers willing and active participants in the process. All teachers are making use of at least one type of computer application, and, in fact, some teachers are now finding the time to design *and* develop their own *HyperCard* stacks.

Finally, I want to emphasize that, although of obvious benefit to the teachers and graduate students, having funds for their support was not the key to success for our collaborative project. During the formal funding period in which stacks were designed and developed for TCET, informal development continued with other teachers and graduate students, and it continues today. It was our observation that once inservice teachers become familiar with a technological application, only they can best envision its use in their particular circumstances. Graduate students in instructional technology, perhaps with limited inservice experience, nonetheless are learning concepts and methods for developing educational technology materials. Simply put, our key for success was really more a matter of getting the inservice teachers and graduate students together.

For further information about the stacks or TCET, contact the Texas Center for Educational Technology, P. O. Box 5155, University of North Texas, Denton, Texas 76203-5155 (817) 565-4433.

George H. Culp is Assistant Director, Computation Center, and Senior Lecturer, Department of Curriculum and Instruction at The University of Texas at Austin, Austin, Texas 78712-1110 (512/471-4900).

HyperCard Stacks Produced by The Collaborative Software Development Project

Name	Area	Grades
Letter people	The alphabet with word examples	K-1
Farm animals	Information about selected animals	K-1
A pocketful of rhymes	Six of the classic nursery rhymes	K-1
Dinosaurs	Information about selected dinosaurs	K-3
Zoo animals	Information about selected animals	K-3
Texas animals	Information about selected animals	1
The USA	Selected information about the states	1-2
Food groups	The basic four food groups	1-3
Caves	Information about cave formation	1-3
Simple machines	Examples of the six simple machines	1-3
Renaissance inventions	Selected inventions of the period	3-5
Texas facts	Selected information about the state	3-5
Days of the dead	History and art of the Mexican celebration	3-6
Fiddlesticks*	Families of musical instruments	4-6
Trumpet of the swan*	Information related to the e. B. White story	4-6
Plant unit	Optical data windows on science use	1-3
Animal unit	Optical data windows on science use	1-3
Stars and constellations	Optical data windows on science use	1-3
The sun	Optical data windows on science use	1-3
The moon	Optical data windows on science use	1-3
Parts of the body	Optical data windows on science use	2-4
The five senses	Optical data windows on science use	2-4
Science around us*	Optical data windows on science use	3
Water cycle	Optical data windows on science use	4-6
The rain forest	National geographic videodisc use	4-6
Artists and their work	National museum of art videodisc use	All levels
Government: what's it all about?	Discussion of the 3 branches of government	All

* Award winning stack, Christopher Columbus Consortium, Apple Computer, Inc.

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In the Classroom II:

Hooking Them With Hypermedia—In Any Subject!

John Snyder

The strengths of hypermedia are becoming increasingly apparent as more and more educators begin to tap their potential in the classroom. The array of projects that appeal to the boundless energy and imagination of today's students is also burgeoning, but ideas that involve both hypermedia and "hyper" kids often seem rather in short supply.... *The wait is over.*

Seven tested creations—six relatively standard-sized projects and one Grand Finale—await your discovery. And the most beguiling aspect of the group is that they are not ideas that must come to fruition only in a programming lab. They are designed to be accomplished in subject-area classes, bringing the computer into its own, as a true tool in the hands of a blossoming intellect.

Hats I Wear

One of the easiest initiations into the art of hypermedia is the Hats I Wear project. Advantage is taken of the student's natural fascination with self, and a preliminary explanation is made of the term "hats" as it is used to stand for the various roles a person plays in life. Examples may include son/daughter, brother/sister, team member, church member, boy/girlfriend, and on and on.

Take *LinkWay*, for instance. The first day, the class is introduced to the techniques of opening folders, creating pages within the folders, and making field objects. Then each student is given time to create a single page with his/her name in large type in the middle and at least six "hats" in smaller type in various positions around it.

On the second and third day, the students are to create a similar page for each hat, with the "hat" in the middle of the page and details about the hat around it on the screen. Finally they are shown how to create buttons and how to link pages. Then they are given a class period to place a button by each hat on the name page to allow the user to jump to the page which explains it, and another button on each explanation page to jump back to the name page. The control is complete, the feedback immediate, and the subject is the most important member of their growing world. Small wonder that they usually take to the project like the latest Nintendo.

This is My Home

The second step in proficiency for the students is taken when they learn to create art and diagrams in one of the *LinkWay* tools called LWPaint. It's an intriguing task to draw an overhead view of one's own home. Artistically talented students are often surprised at how challenging it is; students who hesitate to draw stickmen are often surprised at how easy it is.

An entire period, and sometimes two, should be allowed for the students to fiddle with the diagrams. Once completed, it can be placed in a folder with a Picture Object. The process is then repeated for each room, showing the contents in each as if one were standing in the room. Invisible buttons are then placed over each room in the overhead diagram which can then link to the page displaying the additional details. Another button on the room page can link back to the overhead page. Once again the child is the expert. They are given credit for supplying information, and the home is seen as something important enough to spend time on in school.

The Electronic Resume

Another direction is to utilize those Picture Objects to import photographs. A snapshot can be scanned in with any scanner and the result can be placed on the opening screen of a folder which showcases pertinent details about the student. One page can be created for work experience, another for personal references, another for school activities, and so forth. The headings can be placed at intervals around the photograph on the opening page, and a prospective employer can click on any area he/she chooses to explore.

In order to make the folder a practical project, a system boot disk is created. Permission has been granted and provision made by *LinkWay* to create runtime versions of the hypermedia. When that is accomplished, an autoexec.bat can be placed on the disk to automatically load an run the folder and an autoexec button placed on the base page of the folder to jump immediately to the introductory page.

When it is complete, the disk can be handed to a prospective employer. The employer can place the disk in drive A of a computer, turn it on, and the project does the rest of the work. The student is a step ahead of the competition, and is the proud owner of something that makes him or her look pretty impressive.

Interactive Fiction

The limits of the mind are the only limits involved when the project at hand is interactive fiction. The project begins by creating a simple linear story using only text fields on a series of electronic pages. When that has been accomplished, the student can illustrate the story by whatever technique is appropriate to the story.

Once the story is finished and illustrated, the student finds a point in the story at which a decision could be made. Does the hero show up or not? Does the villain have a change of heart? A page is prepared which presents the question and allows the user to answer by means of a link button. The student then prepares another branch to the story line to correspond with the alternative which did not formerly exist, and links the question page with the beginning page of each chain of events.

The bifurcating process can be continued for as long as time allows and interest is maintained. In addition, the project provides many opportunities for discussion of decisions and their consequences.

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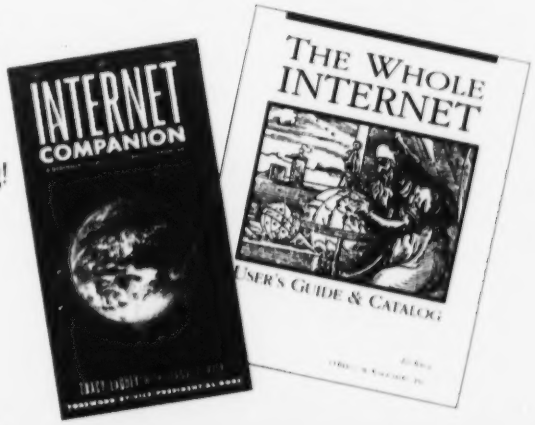

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Peer Tutoring (How To Hug)

"Everybody is an expert at something" is the basis for the Peer Tutoring project. Each student chooses something he or she is particularly good at. Those who claim that they aren't good at anything are assigned to develop the area they are least bad at. Most find that they know more than they thought once they get started, and many start something else after thinking about it for a while.

The first page represents the subject in the broadest possible terms and lists its main subdivisions. A page is prepared for each subdivision and then linked to the first page. Each area or task is subdivided until it can be represented on a single page. Each of the resulting pages is developed with text and/or pictures until a final product results, sometimes unexpectedly (sometimes the student gets so caught up in the creation that the end takes him/her by surprise). Topics have ranged from the U.S. Civil War to an explanation of the art of kissing.

The Paperless Term Paper

The Paperless Term Paper is a little more formalized version of Peer Tutoring. The course often dictates the choice of subject, and a formal bibliography is often included. The experience of research still plays an integral part in the production of the end product, but the novelty of the electronic medium, with its ability to display vivid pictures and diagrams and its potential for non-linear development, often captures the enthusiasm of an otherwise apathetic student.

This Is...(The Great Group Grope)

The grand finale of any course that utilizes hypermedia is the This Is...project. If the course dictates the subject, that course provides the overall direction. For instance, a course on the U.S. Civil War might subdivide into People and Battles. Further subdivisions might be outlined on the blackboard or overhead until manageable individual projects emerge. In this case, one person's project might describe a particular general or a particular battle.

While the students develop their projects, the teacher should develop a folder that contains a series of pages outlining the various subdivisions. The first page, for instance, would contain the major title "The U.S. Civil War" and perhaps the years it spanned. It should also list the subdivisions and place a button by each that would allow the user to jump to the page containing further subdivisions. For instance, the "People" subdivision might be further subdivided into Union figures and Confederate figures.

Finally all the individual projects—that of the teacher as well as those of the students—arrive at a state of at least tentative completion. At that point, all the projects are copied into a single subdirectory. (Care should be taken that each folder has a different name.) The teacher's folder is then used to link to all the student projects by using link buttons to access the appropriate student folders. For instance, when the user had clicked on buttons that eventually led to the story of U.S. Grant, the link button would then jump to the folder about Grant developed by the student. A minimum of one button would be included in the student folder which would allow the user to jump back to the coordinating folder.

Since *LinkWay* provides its licensed users with the ability to create runtime versions of folders and to distribute them freely, the Grand Project can be collected on individual disks and the student can take home the entire exploration, complete with his or her contribution to the whole. The traditional term paper will probably never lose its merit, but by integrating individual efforts into the whole, and making that whole available to the individual contributors, the Great Group Grope may well finally offer a feeling of belonging and value to a student who might otherwise continue talented, but alone.

Conclusion

Hook them on exploring a subject wherever it takes them. Hook them on contributing to the group effort by excellence at the individual level...*Hook them on hypermedia.*

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In the Classroom III:

Wyoming Schools Experiment with Virtual Reality

John C. Russell

In public education it's hard to keep up with yesterday's and today's technologies, so we decided to try our hand at one of tomorrow's—virtual reality.

It doesn't take a fan of Star Trek's holodeck to know how significant total immersion in an environment can be to understanding. Experience in simulated worlds where real sights and real sounds surround you as you move through the world is the ideal for every hungry student and dedicated teacher. The*creation* of those worlds is even more valuable to the instructional process.

Background

In the Natrona County (Casper, Wyoming) schools, we are experimenting with virtual reality. With limited funds and unlimited interest, we have invested in five 8MB-IBM 486 computers. Each system is equipped with a Sound Blaster card, Boca I/O AT 44, Mattel Power Gloves, Sega glasses, Gravis joysticks and Cyberscopes. Three pieces of software are installed on each system: *REND-386*, a program available on the Internet; *VREAM*, a commercial product from VREAM, Inc.; and *Universe Filebench*, written by Rob Santiago of Virtual Dynamics.

Our project was kindled a year ago when I was invited by Rob Santiago to come to Washington, DC to meet with him and fellow VR enthusiasts. After several hours of demonstrations and discussions, it was clear that there was something important for our schools in this new technology. In May, 1993, Rob and Eben Gay, of ERG Engineering, came to Casper to deliver an all-day workshop for over 50 educators. They stayed on to visit high school classes where interest was immediate. Before they departed, a cadre of teachers ranging from kindergarten to high school met with them to make some general plans for the 1993-94 school year.

In August, 1993, we contracted with Eben to conduct a week's worth of workshops with a smaller group of our teachers. Assisted by Rob, Eben provided a significant introduction to *VREAM* and the DOS support needed. (As is frequently true in public schools, our K-12 teachers have more familiarity with the old Apple II and new Macintosh platforms; the arcane commands of DOS provided additional challenges to us.) Eben developed written labs that teachers could work through at their own pace with his help.

Interestingly, the person we have as our district "VR field manager" is a retired kindergarten teacher (yes, that's right!), Marj Bisiar. Marj has never met a technology she is afraid of, and has accepted the responsibility of delivering hardware, software, and support to the workshop teachers and their classes.

Integrating VR Into the Classroom

During the first quarter of this year, intermediate-grade classes have had VR systems in their classrooms for several weeks at a time and have moved through existing worlds. In some cases, 6th graders have been able to create objects with moving parts and a variety of attributes. They are helped by the existence of pre-existing polygons.

In these upper elementary grades *REND-386* is very useful in introducing students to VR through the viewing of pre-designed worlds. Universe Filebench, an interface to *REND-386*, is "*Print Shop* easy," according to Marj. Double-clicking on available objects puts them easily into worlds in which the students can move.

VREAM is difficult for most at the elementary level below 6th grade. At Kelly Walsh High School, Becky Underwood's programming class divides its time among Pascal, *HyperCard*, and VR. At this level, *VREAM* and the mathematics involved in programming with three-dimensional coordinate systems takes the VR experience beyond what the elementary students are doing.

Marj raves about the physics being learned, even in the early days of the project. The simple process of making a virtual ball bounce brings students to grips with matters such as weight, elasticity, response to gravity and "touchability." What does it take to make a ball bounce? Plenty, and kids can deal with all of that!

Students at all levels have traditionally learned in a flat world, a world of textbook pages, videotape, and computer screens. Dealing with pitch, roll and yaw—and the x-, y- and z-axes which provide context for them—is challenging. Using the joystick to change the viewer perspective in a world and facilitating movement in worlds is probably more of a challenge for the teacher than the student. Besides being able to relate objects to their coordinates, high school students find it interesting to look behind the scenes at the programming that describes what is happening. Becky may involve C programming in her classroom, applying it to the creation of VR worlds.

An excellent program which is compatible with the experiences we are striving for is *Virtus WalkThrough* from Virtus Corporation. It runs in the welcome Macintosh environment and makes it easy for younger students to create worlds. However, we have no peripheral capability to provide students an immersive experience with *Virtus*.

Conclusion

With a few months of experimentation behind us, it is clear that students can deal with virtual reality. Our experience makes us crave the more powerful, easier and less expensive systems which will inevitably emerge and be available to schools. Meanwhile we will seek to establish a link with a university and see what the grant-writing process can do for us.

***John C. Russell** is a Computer Specialist Teacher at Natrona County School District, Casper, WY 82601. Any questions can be directed to him at 71762,1650 on Compuserve; Internet: 71762.1650@compuserve.com.*

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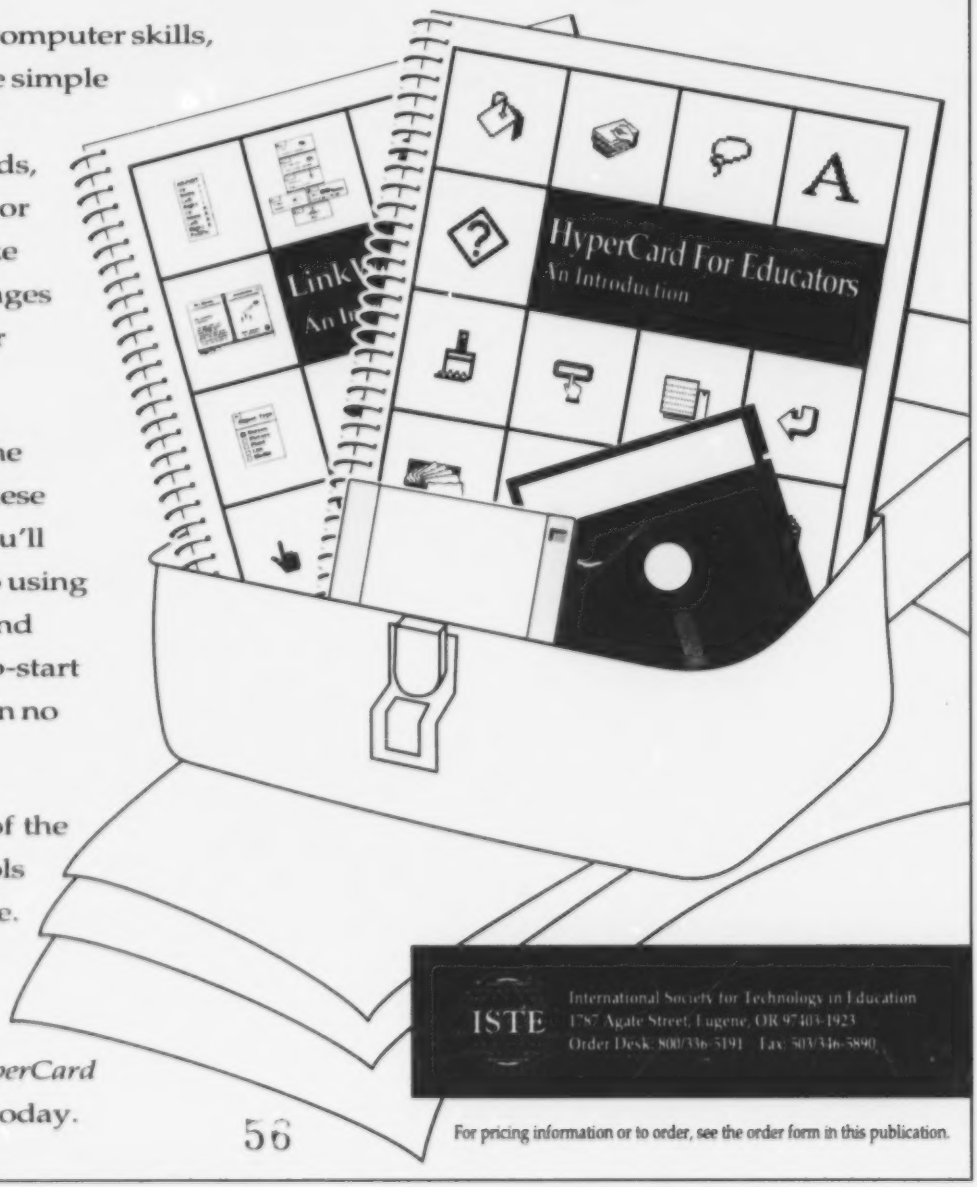

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Here's How It Went...

Annette Lamb

Laserdiscs, Digitized Audio, and HyperStudio in Foreign Language Teaching/Learning

Like many subject areas, foreign language and hypermedia seem like perfect partners. Combining the live-action video of laserdiscs, the flexibility of *HyperStudio*, and the personalization of digitized audio, foreign language teachers and students can produce some exciting learning environments. Laserdiscs are extremely useful because they allow students to see and hear the language spoken in natural settings. *HyperStudio* provides total control over the laserdisc in a simple to use format. Finally, the addition of digitized audio allows students to record, playback, and rerecord their own voice for inclusion in projects that contain text, graphics, scanned images, and laserdisc segments.

File Edit Move Tools Objects Colors Options Extras
Favorite For Lang Template - Card 1
My Favorite Things
Click on a button below to see my favorite things
Favorite Thing 1
Favorite Thing 2
Favorite Thing 3

Figure 1. Main Menu of Template.

Figure 3. Card from Graphics Stack.

The Workshop

Never having worked with foreign language teachers before, I jumped at the chance to develop a workshop with their special multimedia interests and needs in mind. Although the participants had little or no hypermedia/multimedia experience, I wanted to get as far as possible in the half-day available. As a result, I chose to develop and work from samples and templates, rather than starting projects from scratch making cards and buttons. I knew that digitized audio would be the hit of the day. So, I began by developing a simple, single card stack called "Welcome" where

File Edit Move Tools Objects Colors Options Extras
Favorite For Lang Template - Card 2
Favorite Thing 1
Click the video button to see one of my favorite things
Video

Figure 2. Sample Card of Template.

File Edit Move Tools Objects Colors Options Extras
Spanish Practice - Card 1
¿Dónde está ...?
Insert the first laserdisc of the Mexico Vivo Spanish Language Program. Click on one of the activities below.
Q & A Practice
Directions
Getting There
Matching

Figure 4. Main Menu of Spanish Stack.

participants could open a button and use the microphone to record a welcome in their own language of interest.

I created a *HyperStudio* template called "Favorite Things" that teachers could use to get a quick start exploring the variety of options available in a multimedia and hypermedia environment (See Figures 1-2). I also created a sample graphics stack since we wouldn't have time for scanning (See Figure 3). Next, I create a series of sample stacks using the four languages represented in the workshop: Spanish, French, German, and Japanese (See Figures 4-10). The participants worked through the stacks with me. This gave the teachers a chance to see the potential of the media, as well as become comfortable with cards, buttons, and fields. Laserdiscs available through the university were used so teachers could work on projects again later.

Next, I lead the group through repurposing the HyperStudio template using the laserdisc of their choice. Before long, many of the participants were asking about other possibilities such as checking answers, hiding and showing fields and buttons, and screen transitions. They also learned how to create buttons, fields, and new cards as the need arose. This allowed students who were beginners to stick with the template, while speedy participants could create stacks from scratch.

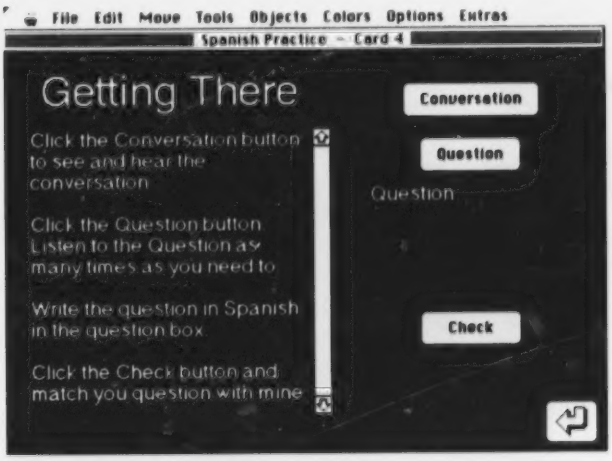
File Edit Move Tools Objects Colors Options Extras
Spanish Practice - Card 4
Getting There
Conversation
Question
Click the Conversation button to see and hear the conversation
Question
Click the Question button. Listen to the Question as many times as you need to
Write the question in Spanish in the question box
Check
Click the Check button and match you question with mine

Figure 5. Sample Card from Spanish Example.

File Edit Move Tools Objects Colors Options Extras
Spanish Practice - Card 5
Matching
Click on the statement that matches the video clip
Esto es mi equipaje
Scene 1
Esto es mi lechuga

Figure 6. Sample Card from Spanish Example.

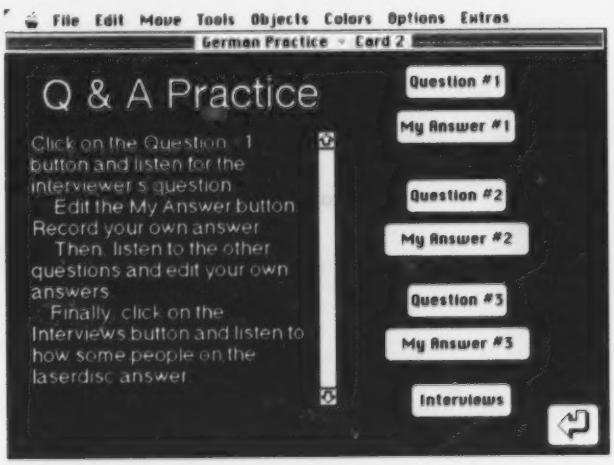
File Edit Move Tools Objects Colors Options Extras
German Practice - Card 2
Q & A Practice
Question #1
My Answer #1
Click on the Question - 1 button and listen for the interviewer's question
Edit the My Answer button. Record your own answer
Then, listen to the other questions and edit your own answers
Finally, click on the Interviews button and listen to how some people on the laserdisc answer
Question #2
My Answer #2
Question #3
My Answer #3
Interviews

Figure 7. Sample Card from German Example.

File Edit Move Tools Objects Colors Options Extras
German Practice - Card 3
Du bist sehr hübsch.
Click The Problem button and listen to the problem. Describe yourself in German. Record the description under the button called MYSELF
Now, click each of the five Person buttons. Choose one of the people and describe them in German in the paragraph below
The description
The Problem
MYSELF
Person #1
Person #2
Person #3
Person #4
Person #5

Figure 8. Sample Card from German Example.

Conclusions

HyperStudio for the Macintosh worked as a great tool for beginning hypermedia developers. However, I found one area of confusion for new users. Some participants got confused between the "Add a Button" and "Add a Video" option. They thought that adding a video would add a button. Actually, this just plays a video immediately when the card is opened. I had simply ignored the "Add a Video" option in my discussions. I suggest that you point it out early to avoid confusion later.

The workshop left the teachers seeing the potential of hypermedia, but also realizing the amount of time production takes. Like any workshop, some participants thought the workshop went too fast, while others thought it didn't moved fast enough. In the end, everyone agreed that they learned a lot and had a great time. They learned multimedia/hypermedia, and I learned a lot more about Spanish, French, German, and Japanese language teaching/learning.

Share Your Experiences

Now it's your turn. Do you have a story to tell? Maybe you've taught a class or workshop that went well or was a disaster, or perhaps your students completed a unique project? Even if you don't think your project

File Edit Move Tools Objects Colors Options Extras
German Practice - Card 4
Ich mochte ...
Click on the video button to learn about the person s pet
Write a short paragraph about your pet or a pet you d like
The Pet
My paragraph

Figure 9. Sample Card from German Example..

File Edit Move Tools Objects Colors Options Extras
Japanese Practice - Card 4
My discussion
Hoteru ni ikitai no desu
You ve just arrived in Japan
You need to get to your hotel
downtown. You can use either
type of transportation shown in
the clips below. Write about
your decision. Use all of the
words below in your
discussion. Print out the card
when you re done
Transportation #1
Transportation #2

Figure 10. Sample Card from Japanese Example..

is unique or all that interesting, it may be helpful for someone trying to get started or looking for new ideas. Send a short description and screen dumps to Annette Lamb.

***Annette Lamb** is an Associate Professor of Educational Technology at the University of Toledo. She is also the editor of* HyperNEXUS.

KING GEORGE WOULD HAVE HATED THIS CONFERENCE...

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Recreating the Revolution
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Book Review

by Carol Truett

New Technologies for Education: A Beginner's Guide

Feeling overwhelmed by all the new technologies in education and the library media center? Not sure how to help your teachers integrate technology into their classroom teaching? Help is at hand in the form of a new book by Ann E. Barron and Gary W. Orwig (1993) entitled *New Technologies for Education: A Beginner's Guide.*

The work begins with a brief introductory chapter that discusses the benefits of teaching with new technology, as well as 12 suggestions for implementation. Other chapters cover CD-ROM, interactive videodisc, digital audio, digital images and video, hypermedia, local area networks, telecommunications, and teleconferencing. Special features of these chapters include extremely readable and understandable text, which thoroughly describes and defines each technology plus related terminology, excellent illustrations and diagrams to enhance the text, related technologies, a glossary, a list of resources for the technology, complete with addresses and telephone numbers, and a recommended reading list.

The readings are current, with most citations bearing 1990s copyright dates. A special bonus is a reproducible brochure at the end of each chapter that folds into a six-page pamphlet providing a brief overview of the technology. These pamphlets, as well as the book chapters themselves, discuss both advantages and disadvantages of the various technologies.

While no one chapter is devoted exclusively to computers, every technology included has computer connections. Some are direct, such as CD-ROM technology; others are only related to computers in specific applications, (e.g., audiographic teleconferencing). Both software and basic hardware requirements are discussed for each technology, and most include highly useful diagrams. For example, diagrams showing the configurations for scanning images and for video digitizing show inside views of the scanner and digitizer cards installed within the computer.

Some chapters provide "how to do it" sections illustrating various technology applications. The one on hypermedia provides steps for creating a *HyperCard* stack with excellent sample screen displays, as well as a brief overview of *LinkWay* folder development. On the other hand, some topics covered too briefly. The discussion of telecommunications, for example, mentions only a few E-Mail networks such as BITNET, Internet, and FIRN (Florida Information Resources Network), while excluding such national educational networks as FrEdMail (Free Educational Mail).

Of special interest to both teachers and librarians who wish to integrate technology into educational applications are the opening "scenarios" found in all of the book's chapters. These provide concrete examples of how the particular technology to be discussed in the chapter can be used in either a classroom or a library setting. A case in point: Chapter 6 on hypermedia describes how a school media specialist produced a multimedia show for visiting Department of Education officials in less than a few hours. The chapter outlines the precise procedure this librarian presumably followed to create the first two screens in his *HyperCard* stack. The other chapters provide similar scenarios where media are combined for learning purposes and both classroom and media center personnel are shown working together to best utilize the new technology.

In summary, while this book will most likely not serve the needs of those needing in-depth information or highly technical and detailed knowledge, it is definitely going to be an asset for those seeking an overview or introduction to the newer technologies. And it should be a serious first purchase consideration for all school media center professional collections.

References

Barron, A.E. & Orwig, G.W. (1993). *New technologies for education: A beginner's guide.* Englewood, CO: Libraries Unlimited. [$27.50 U.S.: Available through ISTE.]

Carol Truett, Dept. of Library Sciences & Educational Foundations, Appalachian State University, Boone, NC 28608.

HyperExchange

Call for Participation

Second Annual, International Conference on
Virtual Reality and Persons with Disabilities
San Franciso Airport Marriott Hotel
June 8-10, 1994

The Keynote Speaker for the conference will be science fiction writer Ray Bradbury. The conferenence is being co-sponsored by IEEE (Institute for Electrical and Electronics Engineers) and California State University, Northridge (CSUN), Center on Disabilities, Virtual Reality and Disability

For the past eight years, CSUN's Center on Disabilities has conducted the conference, "Technology and Persons with Disabilities," which draws more than 2,200 persons from 25 foreign countries, 300 speakers and 140 exhibitors to Los Angeles each March. Because of a growing interest in virtual reality, the Center on Disabilities sponsored the first annual, international "Virtual Reality and Persons with Disabilities" conference in San Francisco of June, 1993. This drew more than 300 persons (11 foreign countries). The second annual, international conference, "Virtual Reality and Persons with Disabilities," to be held June 8-10 at the San Francisco Airport Marriott Hotel. The subject matter of this forum lies at the intersection of two communities: the community of persons with disabilities, and the virtual reality technology community. The primary objective, therefore, is to bring together these two communities in order to share results of research, development, and commercialization in this field. Another objective is to create a peer-reviewed archive by means of a Proceedings, and to disseminate this information widely. These objectives will be achieved through tutorials, technical sessions, panels, demonstrations, and exhibits.

For more information about the conference contact, Dr. Harry J. Murphy, Founder and Director Center on Disabilities, California State University, Northridge, 18111 Nordhoff Street, Northridge, CA 91330-8340; ph. 818/885-2578 V/TDD; fax/Voice Message 818/885-4929, E-Mail: VR@VAX.CSUN.EDU.

Call for Participation

"New Media for Global Communication" International
Conference on Multimedia, Hypermedia, and Virtual Reality
MHVR'94 September 14-16, 1994
Moscow, Russia

Background

The conference is seeking papers, posters, tutorials, and demonstrations. The aim of the conference is to provide a discussion and a demonstration platform for researchers and practitioners involved in the theory, development, application, and analysis of new computer media: multimedia, hypermedia and virtual reality. The conference will serve as a forum for the exchange of information and ideas between Eastern and Western scientists. The Conference is sponsored by the International Center of Scientific and Technical Information (ICSTI), Moscow, Russia. We invite you to participate in the NHVR'94 conference and submit proposals for papers, panels, tutorials, demonstrations and posters on the research, development and applications on topics related to multimedia, hypermedia, and virtual reality.

Submissions

Authors intending to present full papers should submit an extended abstract of up to 2000 words (of text only). Those intending to submit tutorial proposals, posters, or demonstrations should submit an abstract of up to 750 words. An abstract should include the title of the submission, type (tutorial, paper, poster, or demonstration), names and addresses of the authors e-mail of the author who is responsible for all correspondence, and a list of keywords. Please, indicate clearly one or two of the three main conference themes on your submission. All abstracts should be prepared in electronic form in ASCII format and sent byE-mail to Peter Brusilovsky (edtech@icsti.msk.su) or (if E-mail is not available) on a PC diskette to Olga Gornostaeva, ICSTI, 21 b,Kuusinen str. Moscow 125252, Russia.

Authors of accepted papers will be requested to prepare a full version for publication in the conference proceedings. Instructions will be sent concerning the final camera-ready format for their papers. For those who wish to attend the conference without submitting an abstract, please contact the Local Organizing Committee as soon as possible.

Conference Schedule

Papers/tutorials deadline	April 1, 1994
Papers/tutorials acceptance	May 10
Posters/demonstrations deadline	May 1
Posters/demonstrations acceptance	May 20
Camera ready papers	June 20
Registration Early	June 1
Registration Late	June 20
Conference	Sept 14th-16th

Site

Venue MHVR'94 will be held in the International Center of Scientific and Technical Information (ICSTI) in Moscow, Russia. ICSTI, the sponsor of the conference is known in the world as the organizer and sponsor of a number of "East-West" international conferences in different areas of information technology: On-Line Information, Computer Technologies in Education, Open Systems, Human-Computer Interaction and Artificial Intelligence. ICSTI will also provide a special social and cultural program to give participants the opportunity to: establish contacts and have meetings with colleagues from Russia and other Newly Independent States; get first-hand impressions of current governmental, economic, and social developments in Russia; and gain a better knowledge of Russian history, architecture, museums, and theatres. For further information, you may contact: **Dr Peter Brusilovsky**, E-mail: plb@plb.icsti.su fax: +7 095 943 0089.

***Editor's Note**: I send special thanks to Hilary McLellan for forwarding these notices to me. Calls for participation of interest to HyperSIG members are always welcome. Simple forward them by mail or email to Annette Lamb.*

HyperSIG Leadership

The results of the HyperSIG elections have been tallied. The composition of the board is as follows:

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HyperNEXUS: Journal of Hypermedia and Multimedia Studies is the journal for the SIG. Published quarterly, *HyperNEXUS* brings together new ideas, new ways of thinking, and prominent voices in the area.

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Articles are solicited in all areas having to do with the use of hypermedia and multimedia in education and training. Contributions are sought for all columns. This publication seeks to provide a forum for sharing of information among departments, schools and colleges of education. Authors will not receive payment for publication of their material.

Submit three copies of the manuscript, typed, double-spaced, and a copy on disk (Macintosh preferred—saved as an ASCII file, noting the computer brand and word processor used) to the publishing editor:

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Toledo, OH 43606
fac2327@uoft01.bitnet

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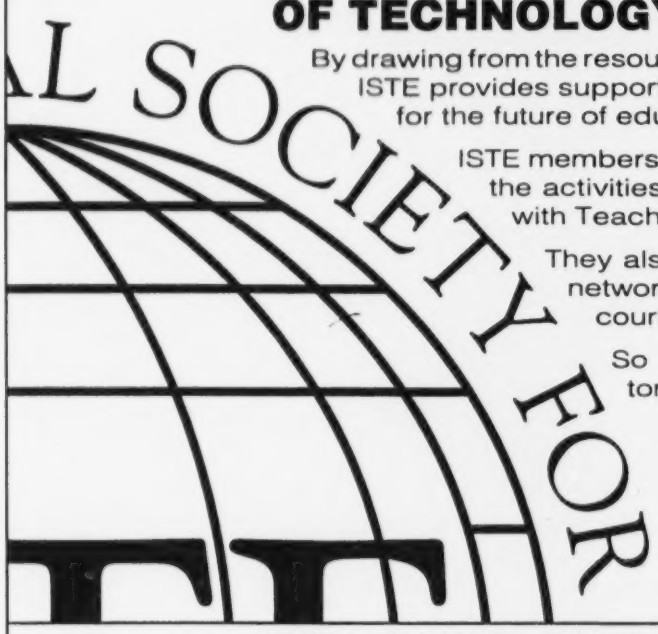

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HyperNexus

Journal of Hypermedia and Multimedia Studies

Volume 4, Number 3 Spring 1994

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IN THIS ISSUE:

HYPERMEDIA ON THE INFORMATION SUPERHIGHWAY

GUIDELINES FOR USING ICONS

HyperNEXUS Volume 4 Number 3

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A Word from the Editor

Annette Lamb

Some of you may have noticed that this journal always seems to be a couple months behind. You get your winter issue in late winter or your spring issue around Memorial Day. You're right. The reason for the delay is lack of articles. We can't print what we don't have! You'll notice some great articles in this issue, but you'll also find a lot of "Lamb" filling space with Hardware Updates, Internet Material, Survey Results, Tidbits, and HyperExchange. Thanks to those people who sent me materials to include in these sections!

Although I enjoy writing, I'd like to give others an opportunity to contribute. Anyone who wants to write anything is invited to contribute! Maybe you just need a little more prompting, so here's my Top 10 List of reasons to write for *HyperNEXUS*.

P.S. As I finish this "Word from the Editor" on May 1, I have no—I mean *no* articles for the Summer issue. So, if you want one before the summer conference, send me something ASAP. I'll be laying out another issue of **something** over the Memorial Day weekend, so just do it! If you can't get me anything that quickly, how about by the Fourth of July? Actually, send it anytime. We need items continuously!

Top 10 Reasons to Write for *HyperNEXUS*

10 It will look good on your vita.
9 You'll get to see your name in the Table of Contents.
8 You'll get to see your name on the article.
7 You'll get to see your name and address at the end of the article.
6 Your family and friends will be very impressed.
5 You're making a contribution to your profession.
4 You're making valuable professional contacts.
3 You'll be "published."
2 Your peers will be very jealous.
1 It will make Annette Lamb very happy! :)

Virtual Reality is Taking Off!

I've been doing a lot of moaning about lack of articles, but I'd also like to give some praise! I'd want to thank two people for their valuable contributions to *HyperNEXUS* this year. Hilary McLellan has done a tremendous job providing current, practical articles on Virtual Reality. In addition, she has been forwarding me information for HyperExchange. Keep up the good work!

Also thanks to Jim McCloskey. He has volunteered to identify, collect, and edit Virtual Reality articles. He is on the faculty at the University of Oklahoma. If you have contributions on the VR side of the journal, send them to Jim McCloskey, Room 101 Copeland Hall, University of Oklahoma, Norman, OK 73019-0270. Voice: 405/325-5228. Fax: 405/325-7565

In This Issue

This seems to be the issue of the lists. First, Boling, Johnson, and Kirkley provide a dozen ideas for using icons in hypermedia and multimedia materials. This practical article will be helpful for people who are developing software, as well as those of you who are selectors of hypermedia and multimedia materials.

Next, McLellan answers the question, "Why focus on virtual reality?" with eight points that will convince you that educators should become knowledgeable about VR. Some of the respondents in the fall survey reminded me that we need to continue beginning-level articles for K-12 educators. Faulkner and McCluskey have provided an introductory article on virtual reality and multimedia in education.

An article titled "Surfin' the Information Highway for Hypermedia, Multimedia, and Virtual Reality" compiles resources forwarded to the editor from many online resources. Readers are encouraged to E-mail me their own favorite Internet listservs, ftp sites, and information sources.

The results of the survey conducted in the fall are included next, along with a short article providing tips from people who completed the survey.

The "Cheat Sheet" for this issue is on the topic of audio in *HyperCard*. James Lindeman guides readers through the development of a stack on listening to announcements at an airport.

Also in this issue are columns on the regular Hardware and Software Updates and HyperExchange.

Conclusion

I'm looking forward to receiving your ideas, articles, and resources for the summer issue, if you haven't already sent them. Forward them to me at the address below:

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Hardware and Software Update

Apple PowerPC

For those people who have been frustrated by dealing with multiple computers and platforms, consider one of Apple's PowerPCs. If you do lots of multimedia work, the high-end machines are recommended. In addition, if you want to run *Windows* multimedia products, you'll need at least 16MB. For more information, contact your Apple Computer representative.

Apple QuickTake 100 Digital Camera

Looking for an easy-to-use multimedia tool? The **QuickTake** camera allows the user to take 32 full-color, 320 x 240 still digital pictures (or eight 640x480 pictures). These pictures can be dumped directly onto the Macintosh then placed into any application from *HyperStudio* to *ClarisWorks*. Cables for PC computers are also available.

This is an Apple Computer product, so contact your local Apple dealer for more information.

HyperCard 2.2

HyperCard 2.2 is the newest version of *HyperCard*. The new version includes color resources, *AppleScript*, and *ADDMotion*. It also include tools for easily adding QuickTime movies into your stacks. The color support is still limited and causes the system to slow down. On the other hand, for people who have been waiting for color *HyperCard*, this is a start.

For more information, contact **Apple Computer Inc.**, 202525 Mariani Ave., Cupertino, CA 95014, ph. 800/769-2775 ext 7810.

HyperCard 2.2 Books

Although many authors are updating their books for *HyperCard 2.2*, Danny Goodman's *The Complete HyperCard 2.2. Book* was out before most people even got the software. There is an excellent section in this updated text containing detailed information about new features.

HyperStudio Mac Update

The updated version of *HyperStudio* for the Macintosh has some interesting changes. The update is free for *HyperStudio* Mac owners. The new version supports multiple screen sizes. In addition, *HyperLogo*, the scripting langauge has been updated and the Animator NBA has been included. Other changes include the ability to group objects, make transparent text fields, create no-click and drop-in buttons, as well as scale and rotate graphics. The updated version also supports live video and provides a QuickTime options box and card option.

If you're becoming a big *HyperStudio* user, consider his summer conference in sunny California! For more information, contact **Roger Wagner Publishing** at 800/421-6526.

More Multimedia

Authoring Systems Software for Computer-Based Training is a new book edited by William D. Milheim. This book highlights the most popular hypermedia/multimedia authoring tools and provides a short tutorial for developing a product using each resource. After an overview of the instructional design process for authoring computer-based training, the book features *HyperCard*, *ToolBook*, *LinkWay*, *Spinnaker PLUS*, *Authorware Professional*, *Quest Multimedia Authoring System*, and *TenCORE Producer*. It also discusses concurrent authoring and provides a checklist for choosing authoring systems.

For more information, contact **Educational Technology Publications**, Englewood Cliffs, NJ 07632.

Multimedia In Schools

Multimedia and Learning: A School Leader's Guide is a new publication by NSBA's Technology Leadership Network. The book describes educational applications of multimedia including laserdiscs and CD-ROM. It also offers guidance on issues such as research, program planning, staff development, facility planning, and copyright.

For more information, contact **Inex Simonin,** NSBA, 1680 Duke Street, Alexandria, VA 22314; or call 703/838-6758.

New Science CD-ROMs

Interactive Physics II lets students simulate all kinds of mechanical systems. You can add controls and experiment. It's intended for people with some physics training. This product is available for both Macintosh and Windows. For more information, contact **Knowledge Revolution** at 415/553-8153.

Simple Machines is a physical science CD-ROM available for the Macintosh. Focusing on ages 8-14, the program includes a teacher's guide, student journal, and science tool kit. For more information, contact **Science for Kids**, 919/945-9000.

TimeTravelerCD is now available in the *Windows* environment. It contains useful information on social studies and science topics. It is also available for the Macintosh. For more information, contact **Orange Cherry/New Media** at 800/672-6002.

How Things Grow is a new science CD-ROM. It uses time-lapse graphics to show the lifecycle of plants. For more information, contact **InterActive Publishing** at 914/426-0400

Two College Resources

Barron's Profiles of American Colleges is a CD-ROM that includes color photographs, college catalogs, admissions information, and short videos. You can search for information by state, tuition range, and subject area. For more information contact, **Laser Resources Inc.**, 800/535-2737.

BEACON - College and Career Planning is also available on CD-ROM. It allows students to search thousands of colleges. In addition, users can find information on financial aid sources and hundreds of civilian and military careers. It is available for IBM compatible machines. For more information contact, **Macmillan New Media** at 800/342-1338 ext. 128.

Two New Foreign Language Resources

Discovering French Interactive is a multimedia language learning CD that combines video, audio, and text to teach French to middle and high school level students. For more information, contact **D.C. Heath** at 800 235-3565, ext. 1767.

Video Linguist is an interactive language learning system available on CD-ROM. The French and Spanish programs run on both IBM compatible and Macintosh computers. Topics include arts, sports, food, historic sights, and fashion. For more information, contact **Cubic Media** at 800/ 232-8242.

Something Free!

Dole Food Company is distributing a CD-ROM called **5-a-Day** free to teachers. It is available for both Macintosh and DOS. It teaches children about vegetables and includes sound, animations, music, and QuickTime movies. Teacher should send a request on school letterhead to **Dole Food Company**, 155 Bovet, Suite 476, San Mateo, CA 94402.

LOOK!

The Information Age

The Information Age is the largest, most interactive exhibit ever mounted by the Smithsonian Institution. This program, filmed at the Smithsonian and elsewhere, explores deveopments over the last 150 years emphasizing people, information, and technology. A few of the items included are the telegraph, the Hollenth Tabulator, and the once secret Naxz ENIGMA encoding machine. A look at the present status of technology and a futuristic look at the world of tomorrow is also included. 30 min/VHS/$39.95.

Multimedia: Exploring The New Technologies

This program provides an exciting introduction to the fascinating world of interactive multimedia. A wide variety of interactive multimedia applications for information, education, training, and entertainment are included. Demonstrations include laservision videodisc technology, compact disc interactive (CDI), computer simulations using CD-ROM and other interactive technologies. 30min/VHS/$39.95.

The Best of InfoQuest

This program shows highlights from *InfoQuest*, AT&Ts exhibition of interactive technologies which is located at the AT&T center in New York City. Traveling InfoQuest Exhibits have also appeared at cities across the country. The program shows hands-on demonstrations and informational segments which demonstrate communications control, electronic fingerpainting and facepainting, interactive video, controlling a robot arm, and more. 30 min/VHS/$39.95.

Orders or Inquiries:

Sunbelt Technologies, Box 4447 West Hall, Texas Tech University, Lubbock, TX 79409

Voice or FAX: 806-792-7617 Purchase orders & personal checks accepted.

A Quick and Dirty Dozen: Guidelines for Using Icons

Elizabeth Boling, Larry Johnson, and Sonny Kirkley

Software icons are freestanding graphical symbols, pictorial or textual or both, used to represent manipulatable objects or possible user actions. Within graphical user interfaces (GUIs) icons are used more and more frequently to represent all kinds of computing information. Effective icons can help users understand software easily and use it efficiently. They can also conserve screen space, add interest and "friendliness" to software, and decrease the time it takes for people to learn new software.

Recent improvements in software authoring tools are allowing more and more people to create multimedia software. Even though novice software developer may have used a lot of software before and used a lot of icons in the process, when they sit down to author their own programs they often end up selecting or creating icons without really knowing how to think about the elements that distinguish an effective icon from an ineffective, or even a counterproductive, icon.

The novice software developer who conducts a thorough search for information on icons and their application in computer environments will find little guidance in the literature. There is some valuable advice to be found in sources like Postonak (1988) and Schneiderman (1992). The critical study of actual multimedia programs, especially their use or misuse of icons, can also provide useful insights to a beginning developer. To get you started we've created a dozen guidelines composed from our research, our review of the related literature, our design experience, and our observation of multiple usability test sessions for multimedia software.

Two common problems exist in developers' thinking about icon design—overemphasis on the aesthetic elements of icons (what do they look like) and at the other extreme, overemphasis on the semantic elements of icons (what do they mean). *Kai's Power Tools* , a *Photoshop* ®plug-in, is an example of the first problem, letting the emphasis on aesthetic elements overshadow the usability of icons. For example, in Figure 1 one of the elongated lozenge shapes on the screen is an icon which gives access to a menu. The other shape with an identical design treatment is simply a graphical image with no funtion at all. In addition, the black box on the screen, an icon with a very different design treatment actually gives access to a menu—essentially the same function. This interface looks impressive, but can be confusing because of the lack of consistency between the way screen elements look and the way they behave (see Figure 1).

The effective use of icons is more complex than either aesthetics or semantics. It includes all the components outlined by Easterby (1970) in his model for symbol structure and performance. Adapting Easterby's model to the design and application of computer icons links the pragmatic, syntactic, visibility, and discriminability components of an icon together to form its perceptibility. In practice these components are inextricably linked, but it is possible to consider each of them individually.

This lozenge-shaped 3-D element is NOT a button
Options
✓Tile Size 96 X 96
Infinite AutoStretch
Normal Apply
✓Procedural Blend
Reverse Blend
Lighten Only
Darken Only
This black 2-D element gives access to a list menu.
This lozenge-shaped 3-D element IS a button
Untitled
This blue-green 3-D element gives access to a list menu.

Figure 1. Texture Explorer Tool from **Kai Power Tools,** *an Adobe Photoshop Plug-In.*

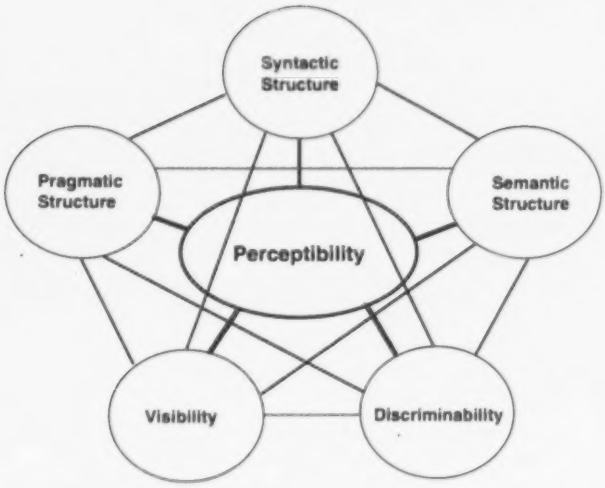

Figure 2. Visualization of Easterby's five components of symbol perceptibility.

The pragmatic component is the context in which a symbol is used (see Figure 2). The semantic component is the symbol's relationship to the function, action, or state it represents. The syntactic component is the symbol's relationship to other symbols in the same set. The visiblity component is the degree to which a symbol can actually be seen. The discriminability component is the degree to which a symbol can be differentiated from other symbols in a set or from other graphical elements in its environment. All these components of symbols contribute to perceptibility, which is the degree to which a symbol may be quickly and reliably understood in the context of its intended use.

Guidelines for Using Icons

1. Make sure all the icons used in one program belong to the same "visual family." You can help users perceive icons as a family by keeping them similar in size and shape, and by using the same color for their background fields. Use the same size, style, and font for text labels in an icon family. Use the same stylistic treatment for pictorial elements of icons (i.e., line drawings, closed versus open images, and grayscale, color, or black-and-white treatments).
2. Group icons with similar functions together spatially. Place icons with related functions near each other, and leave room between "logical groups" of icons to distinguish them from each other.
3. Standardize the location of single icons and icon groups throughout the program.
4. Use redundant information within icons and within interfaces to reduce errors in the interpretation of their meanings. For example, use text labels with pictorial icons, on-screen instructions in using icons, and "text-on-demand" explanations of icons. Avoid creating interfaces with pictorial icons only.
5. Look for standard models and follow them. Find out what software already works well for people who are using it and adapt from there. Be aware that icons and interfaces enjoy copyright, and sometimes patent, protection, so make sure you have *adapted*, not reproduced someone else's solution.
6. Use pictorial icons for objects, tools, and navigation. Use textual icons for abstract topics, functions, or actions.

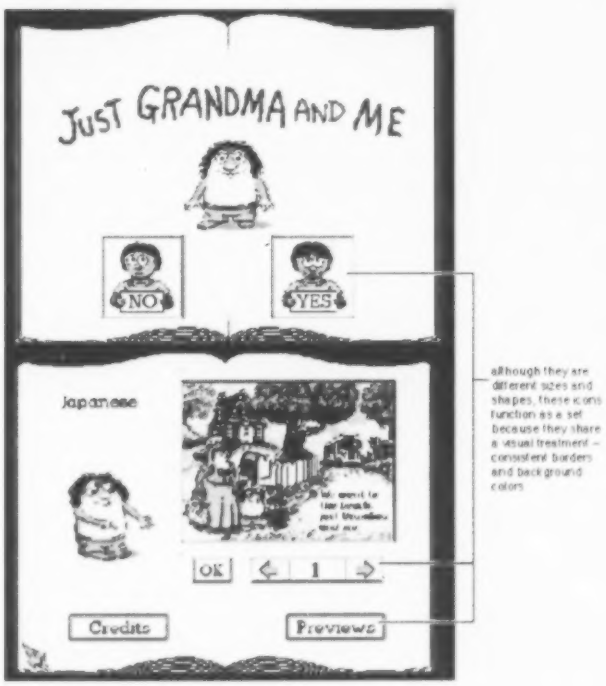
JUST GRANDMA AND ME
NO
YES
Japanese
OK
1
Credits
Previews
although they are different sizes and shapes, these icons function as a set because they share a visual treatment – consistent borders and background colors

Figure 3. Just Grandma and Me, Broderbund.

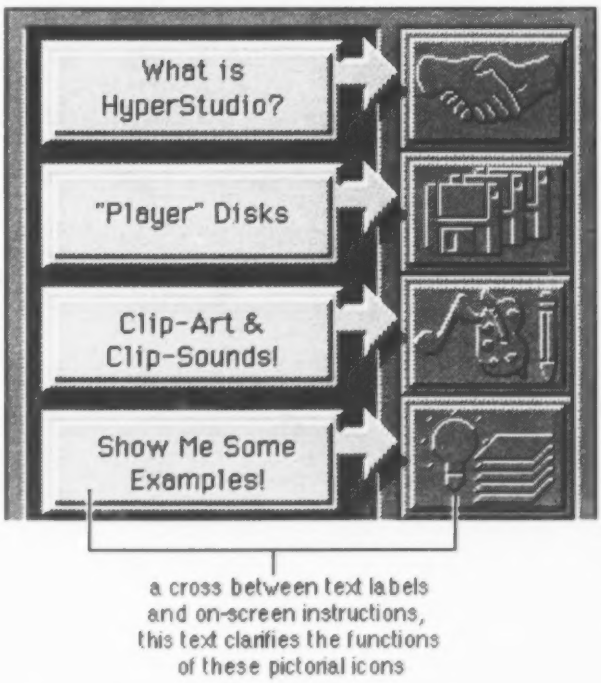
What is HyperStudio?
"Player" Disks
Clip-Art & Clip-Sounds!
Show Me Some Examples!
a cross between text labels and on-screen instructions, this text clarifies the functions of these pictorial icons

Figure 4. HyperStudio, Roger Wagner Publishing, Inc.

7. Use the external shape (outline) of a pictorial symbol to represent a class of related objects. Use the internal shape (detail) of a pictorial symbol to distinguish individual objects within the class (Frutiger, 1989).
8. Make sure that each icon represents the same manipulatable object or possible user action every time it appears in the interface.
9. Make each icon sufficiently distinctive from other icons and images in the interface that users can recognize and remember icons, and tell them apart from elements which are not icons.
10. Use a minimum number of icons. When in doubt, leave it out. Users learn and use small sets of symbols, between seven and nine, more easily than they learn and use larger ones.
11. Respect the visual conventions of the user's culture. In any setting pictorial symbols may convey different meanings than the ones you intend (ie., pointing hands, common objects like mailboxes or trash cans, and representations of people and animals).
12. Test your interface, including the icons, on people from the intended audience for your software. Usability testing will help you discover problems in your interface and with your icons (Nielsen, 1993). Since design guidelines are general advice at best, you should trust your users to show you what works for them and use your own common sense and imagination to provide what they need, even if you end up going outside general design guidelines to do it.

Useful Readings

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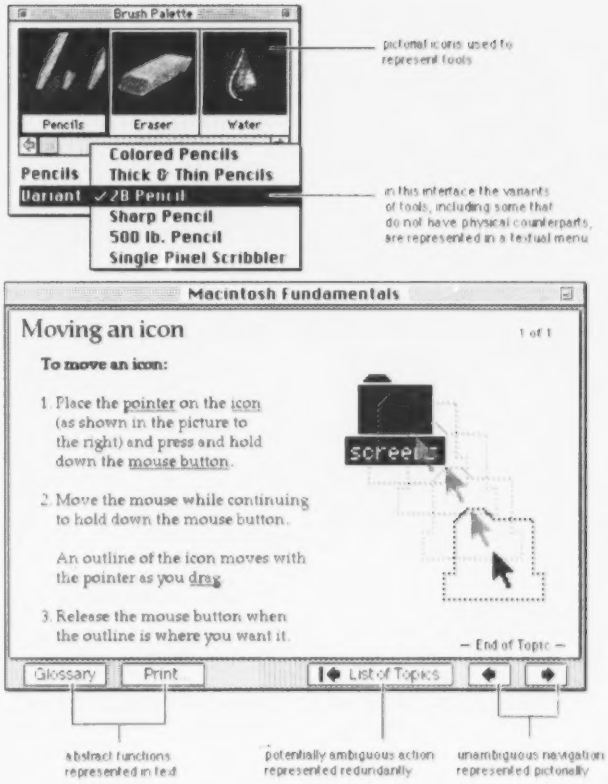
Brush Palette
Pencils
Eraser
Water
pictorial icons used to represent tools
Colored Pencils
Thick & Thin Pencils
Pencils
Variant
✓2B Pencil
Sharp Pencil
500 lb. Pencil
Single Pixel Scribbler
in this interface the variants of tools, including some that do not have physical counterparts, are represented in a textual menu
Macintosh Fundamentals
Moving an icon
1 of 1
To move an icon:
1. Place the pointer on the icon (as shown in the picture to the right) and press and hold down the mouse button.
2. Move the mouse while continuing to hold down the mouse button.
An outline of the icon moves with the pointer as you drag.
3. Release the mouse button when the outline is where you want it.
— End of Topic —
Glossary
Print
List of Topics
abstract functions represented in text
potentially ambiguous action represented redundantly
unambiguous navigation represented pictorially

Figure 5. **Painter 2.0,** ***Fractal Design Corporation.***

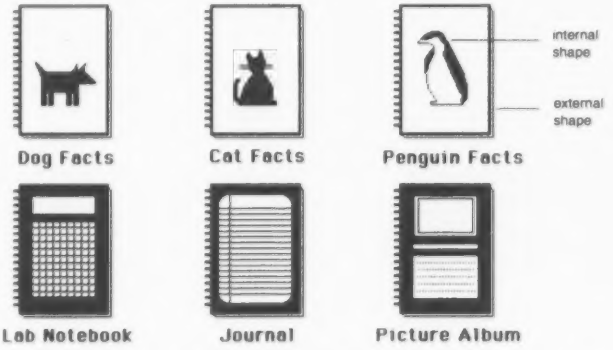

Figure 6. External shapes indicating classes and internal shapes indicating individual objects within a class.

Why Focus on Virtual Reality?

Hilary McLellan

Why should educators become interested in virtual reality? The technology is still very expensive and exotic and it's difficult to know what lies beyond the hype. Why focus on virtual reality? There are several answers to this question:

1. Virtual reality is an emerging technology—perhaps the most important technology of the 1990s (Karnow, 1993). It is certain to have wide-spread effects, including effects on education, perhaps not immediately, but in the long term.

2. Virtual reality is spawning many ideas, applications, and design concerns that are highly relevant to education in areas such as visualization, human performance data gathering, microworlds, and creative learning tools. For instance, VR is being used to gather data on athletic performance that could not be gathered previously, such as a baseball pitcher's hand and arm movements during a fastball pitch. And the great cellist Yo Yo Ma has been using a "hyperinstrument" that monitors the movement of his bow and bow hand during performances. He can review not only an audio record of his performance, but also a record of the underlying gestures, in attempting to understand and improve his abilities.

3. Virtual reality is related to other phenomena that interest and engage both children and adults, such as videogames and fantasy games such as the *Dungeons and Dragons* role-playing game. Americans now spend more money on videogames than on movies. *Dungeons and Dragons* may appear to be an obscure phenomenon that is of interest to very few, but there are other recreational activities related to *D&D* that demonstrate an important trend. Today we have fantasy gaming, online Multi-User Dungeons (MUDs), mystery dinners, and mystery weekends, Civil War battle re-enactments, the Society for Creative Anachronism with its medieval costumes and role-playing, artificial worlds such as Disneyland and other theme parks, and elaborate artificial recreation environments. For example, in Japan, two such parks exist, *Wild Blue Yokohama*, an indoor beach with waves, sand, and palm trees; and *Winter, Spring, Summer, Snow*, an indoor ski slope with artificial powder snow that extends 24 stories tall.

   The world of play and the world of stories are virtual worlds. When I was a kid, I remember that my friends and I would make up episodes for the TV show *Bonanza*. Nowadays, there's a group of people who take episodes of *Star Trek* recorded on video and re-edit them to tell stories that they have created, a form of jigsaw or "cut and paste" interactive stories. This expanding trend stretches our conceptualization of interactive stories. And it demonstrates the power of interactivity—people designing and telling their own stories and adapting stories that are presented to them. Interactive stories are changing our relationship to information (McLellan, 1992; McLellan, in press; Norman, 1993). How can we harness this for learning?

   It is important to note that the book-based fantasy game Dungeons and Dragons has inspired several virtual reality games, including *Legend Quest* (located in Nottingham, England) and *BattleTech* (located in Chicago and Tokyo). And *Dungeons and Dragons* inspires participants to engage in extensive study, research, and learning—how can this motivation be transferred to the realm of education?

   What can instructional designers learn from virtual reality and these related phenomena—to extend the ideas of Thomas Malone (1981) and other analysts (Stevens, 1992) who have studied computer game design and other aspects of designing computer-based programs to promote engagement and learning? Perhaps a great deal. One of the fascinating things about virtual reality is that it is turning into a very social technology. One company that is using the new Virtual Explorers League game center in Walnut Creek, California for corporate training in team building has found that this virtual environment provides a "level playing field" for diverse learners, more so than any other approach to this kind of training (Lakeland Associates, 1993).

   Recently, Trip Hawkins (1994), the developer of the new 3DO interactive game system said, "Computers could be a window on another world, fulfilling John Dewey's vision." This notion of a "window on another world" is especially true of virtual reality, suggesting immense potential.

4. Exciting theory-building is going on in virtual reality that has important implications for education and for the design of computer-based instruction. Brenda Laurel (1991), who calls herself a "research artist," has proposed a model of "computers as theater"; she recommends that human-computer interfaces and virtual reality applications should be designed in accordance with the principles of drama. The basic components of Laurel's model are:
   - Dramatic storytelling—storytelling designed to enable significant and arresting kinds of actions.
   - Enactment—for example, playing a VR game or learning scenario as performance.
   - Intensification—selecting, arranging, and representing events to intensify emotion.
   - Compression—eliminating irrelevant factors, economical design.
   - Unity of action—strong central action with separate incidents that are linked to that action; clear causal connections between events.
   - Closure—providing an end point that is satisfying both cognitively and emotionally so that some catharsis occurs.

- Magnitude—limiting the duration of an action to promote aesthetic and cognitive satisfaction.
- Willing suspension of disbelief (cognitive and emotional engagement).

And Paul Saffo (1994) has commented, "It is not content but context that will matter most a decade or so from now. The scarce resource will not be stuff, but point of view." Virtual reality facilitates the exploration of different points of view. Related to this, Brenda Laurel (quoted in Frankel, 1994) has coined the term "smart costumes" to describe characters that a VR explorer can play—characters that have not only a distinctive appearance but distinctive behaviors. For example, in a VR art project that Laurel helped to design, inspired by Native American myths and ceremonies, VR explorers can play the role of a bird or a snake, taking on the pattern of movement and the vantage point of that creature. A snake views the world from very low to the ground, and moves from side to side as it slithers across the ground. Researchers at the MIT Media Lab are studying ethology, the science of animal behavior, as a basis for designing animal characters in virtual worlds (Sheridan & Zeltner, 1993). Thus, "smart costumes" may have potential in both the science and humanities curricula.

5. Engineers and computer scientists are developing and testing educational applications without input from educators. Educators need to become involved in instructional design for this emerging technology.

6. Hype has distorted our understanding of this emerging technology, which is evolving very fast, but is still only in the Kitty Hawk stage, nowhere near where some of the hype might have us believe. Educators and educational technologists need to become informed about the real potentials of virtual reality and other emerging media.

7. This technology may help in developing skill sets that are coming to be recognized and given greater importance. Howard Gardner's (1983) model of multiple intelligences is one example of this. McLellan (1994) discusses how existing virtual reality applications can support all of Gardner's multiple intelligences, including (1) spatial intelligence; (2) bodily-kinesthetic intelligence; (3) logical-mathematical intelligence; (4) musical intelligence; (5) linguistic intelligence; (6) interpersonal intelligence; and (7) intrapersonal intelligence.

8. Virtual reality offers great promise in the area of special education. For example, Virtual Technologies of Palo Alto, California has developed a "talking glove" application that makes it possible for deaf individuals to "speak" sign language and have their hand gestures translated into English and printed on a computer screen, so that they can communicate more easily with those who do not speak sign language. Virtual reality offers great potential as a tool to enhance human perception and human communication.

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Beginner's Special Feature: Virtual Reality in the Classroom

Debra J. Faulkner and
James J. McCluskey

Abstract

Virtual reality technology has virtually exploded in the past few years. It's applications in our lives are practically limitless. The technology is even being used in our education systems. In fact, virtual reality may be the savior of America's failing education system. Interactive multimedia has the ability to spark interest and build the imaginations of our children. By igniting imaginations, virtual reality has the ability to promote learning by bringing curious minds back into the classroom. Interactive multimedia will give our teachers a chance to teach.

Virtual Reality in the Classroom

People are interesting beings who have evolved from the primitive Homo sapiens of the past to the technological wizard of today. Cave people of the past are computer people today.

The people who discovered fire and electricity and the people who are responsible for many modern-day inventions have something in common: the desire to succeed. Competition to become bigger, better, or faster inspired the great people of our past to dream, discover, and invent. "There must be a better way" was the statement that most likely inspired people to develop new technologies (Hayward, 1993).

Peterson (1990) said, "Our belief in the power of technology, harnessed by creative individuals, has led us to pioneering feats in photography and, ultimately, to innovative applications of computers, telecommunications, and multimedia tools in the classroom" (p. 2). There must be a better way to teach our young people. New methods are needed to attract our children back to the classroom and spark student interest and imagination.

Computers are a prime example of the answer to the question, "there must be a better way." People are always seeking a better and faster form of communication. The computer meets people's needs derived from the "communication force." Hayward (1993) said the communication force was a result of man's need to transmit clear and accurate information stemming from his desire to hear and be heard and the yearning to understand and be understood.

Since 1946, technicians have labored to improve the technology of computers. The computer has evolved from the first room-sized model to the present desktop versions. Advances in technology have made the computer a very efficient means of communication (Hayward, 1993).

Today the hot potato of the computer world is a technology termed "virtual reality." Virtual reality has been in the works for a short time. Most experts in the field concur that the first use of this new technology was probably in the late 1980s (Hayward, 1993).

Virtual Reality Defined

What is this new buzzword "virtual reality?" The term was first coined by Jaron Lanier. Virtual reality describes the philosophical debate of reality. It is "virtual" because it is hard to distinguish between what is real and what is not (Hayward, 1993). Virtual reality uses the computer and a variety of accessories to create simulations of the human experience. Its purpose is to improve communication in all forms between humans, machines, and other beings (Hayward, 1993).

Virtual reality is a phenomenon that exploded in the late 1980s and continues to build its future in the 1990s. The term is used to describe a family of computer programs that simulate reality by generating apparent three-dimensional space known as cyberspace (Emery, 1991). Inside of this "cyberspace" a person can move about and do things. Through computer technology, a person can imagine a place, step into it, and react with it. The computer-generated, artificial, 3-D world creates a virtually real world. It can often be difficult to determine what is real and what is not.

To play in a virtual world, a person needs many gadgets. A data glove and a head unit or goggles will provide the hardware basics needed to move around in the virtual world. More advanced systems use larger, more powerful computers and full body data suits to propel the user through the virtual world. Some "home-brew" VR systems have been assembled using Mattel's "PowerGlove," "home-made" goggles, and "Swivel 3-D" software.

Uses of Virtual Reality and Multimedia

Virtual reality is currently being used in a number of ways. The technology is being used in flight simulators, video games, movies, and in the classroom. These are just a few examples of the almost endless list of uses for virtual reality. Many have asked the question, "What can you do with virtual reality?" Emery (1991) noted that the answer is anything you want.

A key component of virtual reality is that it must be interactive. Virtual reality is not a passive or one-way experience. Experiences like using your imagination while day-dreaming or watching television don't qualify as virtual reality because there is no interaction (Emery, 1991). The term "interactive" can be described as a conversation where all the parties are involved, no one is simply a viewer or a by-stander (Kantrowitz & Ramo, 1993).

Virtual Reality and Multimedia in Education

On the educational forefront, this new interactive technology of virtual reality is commonly referred to as interactive multimedia. Multimedia is more than just filmstrips, sound, and computer software. Multimedia products combine text, video, sound, and still photographs into software in which users can pick and choose the information that interests them. Interactive multimedia allows a one-on-one relationship between learning media and students through the personal computer (Caruso, 1993). Multimedia enables a student to learn things in a wonderful new way.

Multimedia can bring books to life. The new medium often has no set story line, the user can choose how the story is told by clicking on several choices on the computer screen. With a personal computer and a specially

designed compact disc called a CD-ROM, students can experience a form of virtual reality in the classroom.

American education has suffered severe setbacks in recent years. High school drop-out rates are on the rise. The evening news often reports about the apathy of our students and their lack of interest in the classroom. The current education crisis is so severe that new approaches to education must be found. Students will no longer accept the standard approach to instruction. In fact, trying to continue teaching by returning to basic instruction will simply make the situation worse (Streeter, 1992).

Today's children often have television as a baby-sitter. The current generation is often referred to as the MTV (Music Television) generation. These children have become used to 15-second images flashing before their eyes at a high rate of speed. Many music videos on MTV have perfected this montage style of editing. Compile television with video games like Nintendo and Game Boys and the traditional classroom blackboard and textbooks seem boring.

Traditional education methods are not fun. Some might argue that education is not supposed to be fun. But we will all agree that something needs to be done to recapture attention and interest in the classroom. We must find a way to transfer the excitement of the entertainment industry into the classroom.

So why not look to video games, interactive multimedia, and virtual reality for the answer? In 1989, kids spent over $10 billion on video games (Newcomb, 1990). Steven Silvern (1985-86) recommends using video games in the classroom as an educational tool. Video games could alleviate boredom, drudgery, and tedium now associated with school by introducing fun and excitement into the learning process (Silvern, 1985-86).

Our educational system will soon be forced to seek alternative teaching methods. These new methods will most likely come in the format of computers and virtual reality.

The National Geographic Society has recommends that educational materials try to be as "lively, dynamic, and intriguing as the TV, music videos, movies, and computer games that have so captured this generation" (Peterson, 1990).

Advocates of virtual reality and interactive multimedia are hailing it as the medium to attract a child's interest in the classroom. Because interactive multimedia emphasizes sound and visual images it can attract interest. This new technology has the ability to hold captive the wandering minds of students and is being called the savior of the American education system (Caruso, 1993). The interactive nature of current software programs have the ability to capture the interests of our students.

Virtual reality and interactive multimedia are a direct solution to the passive learning problem. The interactive medium has the ability to reach students who have bad experiences or who are uninspired by school. Textbooks and blackboards do not spark imagination. The imagination is an essential aspect of education which has gone unnoticed. As educators, we have a responsibility to educate the imagination of our students (Silvern 1985-86).

There are as many protesters of classroom virtual reality as there are advocates. However, several studies have been conducted which suggest that multimedia interaction increases retention and promotes exploration and curiosity. John Sculley, President of Apple Computer, Inc. said "people remember 10 percent of what they hear, 20 percent of what they see, 40 percent of what they discuss, and 90 percent of what they do" (Caruso, 1993). A possible retention rate of 90 percent is a strong argument advocating the use of virtual reality and interactive multimedia in the classroom. A greater efficiency of learning can be accomplished if a person can actually experience a learning situation instead of merely reading about it or listening to a teacher's lecture (Rheingold, 1991).

Our current classrooms promote passive learning techniques using chalkboards and textbooks. Examinations are used to measure learning. Virtual reality technology promotes integrated and active learning.

Virtual reality can change the way we learn. In the classroom students presently read about history. Virtual reality will allow students to experience history.

Emery (1991) used popular comic strip characters, the Teenage Mutant Ninja Turtles, as a prime example of how interactive learning works. If you asked typical American elementary school children "who are Michelangelo, Raphael, Leonardo, and Donatello?" they will most likely tell you they are the crime-fighting Ninja Turtles. Because the "Turtles" bear the names of several of the great masters of art, it would be very appropriate to use them as a vehicle to study about art history. Children can learn about the four famous artists by using interactive multimedia software.

The Ninja Turtles are just one example of how interactive multimedia can help our children learn. There are many other entertainment based characters which can attract interest and curiosity in the classroom.

The new multimedia encyclopedias use text, pictures, and sound to entertain its readers and entice them to learn. The tools used in interactive multimedia inspire an interest in the process of gathering and understanding information (Caruso, 1993). To learn about President John F. Kennedy, a child can read text, hear sound bites of a speech, and see moving pictures all on the CD-ROM encyclopedias.

The equipment needed to place interactive multimedia in the classroom will not be inexpensive. However, since CD-ROM was introduced, the prices have dramatically dropped. As of the beginning of 1993, over 466,000 units had been sold. The industry hopes to have sold over 17 million CD-ROM players by 1996 (Kantrowitz and Ramo, 1993).

Interactive multimedia instruction in the classroom does not have the ability to solve all of America's education problems. But neither will other clever gadgets like computers or videodiscs. Educators will be forced to provide meaningful messages via this new technology or this form of instruction will be useless (Caruso, 1993). What interactive multimedia can do is attract interest in the classroom and give the teachers a chance to teach an inspired child who is listening and eager to learn instead of daydreaming about MTV.

Begley (1993) stated that it would be easy to dismiss teaching with interactive multimedia as the same old thing with gee-whiz packaging. Perhaps this is true, but virtual reality combined with educational applications can be exciting.

Conclusion

We can meet our responsibility of educating our children's imaginations by using interactive multimedia. The education profession is responding powerfully to virtual reality curriculum. Educators understand that the learning potential of well designed virtual experiences could take students to new heights of learning (Helsel, 1992). There is great promise in this new technology.

There seems to be no limit to virtual reality and what people want to do with it (Emery, 1991). There are so many possibilities that pessimists say

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Multimedia Power Tools

Peter Jerram and Michael Gosney

For intermediate to advanced Macintosh users, this book covers the tools used in multimedia production, including sound, video, imaging, peripheral hardware, authoring tools, and more; project planning and design; working across platforms; producing sound, animation, and video; and interfaces and interactivity. It comes with a CD-ROM of multimedia tools that are explained in the text.

Creating Multimedia On Your PC

Tom Badgett and Corey Sandler

Provides beginners with an introduction to multimedia projects and includes good suggestions for the planning and production stages. The enclosed CD-ROM contains working versions of several software products, including *StoryBoard Live! 2.0*, demos, multimedia tutorials, animation samples, motion video clips, a glossary of multimedia terms, and more. The text includes a discussion of multimedia hardware and software. It covers *StoryBoard Live!*, *Action*, *IconAuthor*, and other software as well as the use of spreadsheets, databases, word processors, and drawing programs in creating multimedia products. Appendices include software references, data compression information, an audio reference, video references, and a discussion of file formats.

Multimedia and Learning—A School Leader's Guide

Anne W. Ward, Editor

A collection of chapters by different authors that provides an overview of multimedia technology and its applications in education. Experts in the field discuss research, staff development, facility planning, and copyright compliance, and offer tips on how to plan for, select, and apply multimedia. Case studies illustrate working multimedia solutions.

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virtual reality technology will explode out of control and eventually be harmful. The unknown possibilities are what makes virtual reality a bit scary. People are afraid of change. Virtual reality can be very powerful technological tool. Let's strive for the good and put this new technology to work strengthening our education system.

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Surfin' the Information Highway for Hypermedia, Multimedia & Virtual Reality

Edited by Annette Lamb
alamb@uoft02.utoledo.edu

If you love hypermedia and multimedia, you need access to the great information highway! Internet is an endless resource for information, activities, and ideas. This new column began with one simple E-mail message. I was requesting information about online hypermedia and multimedia resources. This message was forwarded to the EDTECH listserv, then to other listservs. Pretty soon I was getting ideas for this column from all over the world. Everything you see in this issue's column is the result of one simple electronic message to someone I didn't even know. Of course this is just a beginning. In coming months, I'm hoping you will all E-mail me your favorite listservs, ftp sites, and other electronic resources.

Internet Tidbits from Experienced Surfers

EDTECH-L is a good listserv for general information and discussions concerning Educational Technology.

There is a new journal coming out called K-12 School Media Professions. It will be published in print and Internet versions. For subscription info call, 1-800-248-8466. The editor is Susan Veccia: 202-244-6710. Her E-mail address is **veccia@well.sf.ca.us**.

MEDIA-L serves as a network for people in the media services profession to ask questions and discuss new procedures or services. The listserv address is **listserv@bingvmb**.

MEDCC-L, Media, Culture, and Curriculum has been developed for conversation of these topics also. To join, send a message to: **listerv@uafsysb.uark.edu**. Include the line: **sub medcc-1 your name**

For information on a *HyperCard* discussion list, try **hypercrd@msu.bitnet**.

Some of the best hypermedia net stuff is available from WWW sites using Mosaic software from NCSA. Many sites are already online offering access including some K-12 sites. They're huge net hogs, but they're also good examples of the future potential of hypermedia over a network. A good place to begin looking for other sites is the NCSA Home Page, which allows the user to access and search files of Internet resources.

One favorite resource on the "web" is available at the University of Kansas. If you telnet to **ukanaix.cc.ukans.edu** you can login as **history** to see a hypertext database on history, **ex-ussr** to see a database on the former Soviet Union, **kufacts** to see information about the University of Kansas, and **www** to access Web information.

On the useNet try **comp.sys.mac.hypercard** or **comp.multimedia**.

Internet Resource for Educational Technology Internet Resources

INFOBITS is an electronic service of the Institute for Academic Technology's Information Resources Group. Each month they monitor and select from a number of information technology and instruction technology sources that come to their attention and provide brief notes for electronic dissemination to college and university educators. The following resources were posted on INFOBITS that would be of interest to hypermedia/multimedia people.

INFORMA is a forum for users of IBM technology in libraries. This year's INFORMA Conference, titled "Images as Information Resources—Moving Ahead of the Curve," explored the opportunities and problems of integrating image information into electronic library collections and services. While the Internet is a great resource for bibliographical and textual information collections, there are few image collections currently available. Based on what I saw at the 1994 INFORMA Conference, we should expect, in the next couple of years, more projects combining image information storage with online delivery. One of the projects presented at the conference was "FDR: Day by Day," a joint undertaking between the Franklin D. Roosevelt Library, Marist College, and IBM. The project will present a chronology of FDR's presidency and deliver, via telecommunications technology, texts of speeches (including images of original drafts with FDR's handwritten changes), newspaper accounts, handwritten letters received by FDR, newsreel footage of FDR's speeches, and other documentary film from the World War II era. The project will be a model for how other presidential libraries may someday make their research materials available to students, teachers, and researchers. March 1995 is the target date for getting the first stage of the chronology on the Internet. Nearly 1,000 scholars have been invited to submit additions, annotations, or challenges to entries. An E-mail address has been set up for historians who are interested in this project. If you would like to be included, send E-mail to: **FDRL@MaristB.Marist.edu**.

The Interactive Mathematics Text Project of the Mathematical Association of America has as its goal the improvement of mathematics learning through the use of computer-based interactive texts. To achieve this goal the IMTP holds summer workshops on the authoring and use of texts and supports selected individuals as text developers. Major funding for the IMTP comes from the IBM Corporation. Learn more about the IMTP by gophering to: **poincare.math.upenn.edu**. The gopher site includes information on Project CALC, MathKit for Windows (an IAT project), descriptions of IMTP sites (Los Angeles Pierce College, Seattle Central Community College, The University of Houston - Downtown, The University of Michigan - Dearborn, and Towson State University), project reports, and summer workshops.

INFOBITS is published by the Institute for Academic Technology. The IAT is a national institute working to place higher education at the forefront of academic technology development and implementation. A partnership between the University of North Carolina at Chapel Hill and IBM Corporation, the IAT strives to facilitate widespread use of effective and affordable technologies in higher education. To subscribe to INFOBITS, send email to **listserv@gibbs.oit.unc.edu** with the following message: **SUBSCRIBE INFOBITS yourfirstname yourlastname** substituting your own first and last names. Example: SUBSCRIBE INFOBITS Ellen Gilchrist. If you have problems subscribing or want to send suggestions for future issues, contact Carolyn Kotlas at **carolynk.iat@mhs.unc.edu.**

Virtual Reality & Internet

The Human Interface Technology Laboratory (HITL) at the University of Washington in Seattle has an ftp site that contains several papers written

specifically about virtual reality in education. There is also a bibliography of VR articles with a section on education.

Instead of listing different nodes on the Internet, I thought it would be easier to stick with one. The papers I have noted below, specifically the information resources papers, contain a pretty comprehensive list of VR information available on the Internet, journals, and other places. There are many papers at the HITL Internet site and you'll want to "browse" around when you log onto HITL. I have only listed a small sample of the info available. Below are three groups:

1. Information Resources
2. Papers on VR and education
3. Discussion Groups on VR

At the HITL ftp site use "**anonymous**" for your name, and use **your E-mail address** as the password

Sample items include the following items:

"Virtual Reality and Education: Information Sources"
ftp site: **ftp.u.washington.edu**
Directory: **public/VirtualReality/misc/papers**
Filename: **VR-Education-Bibl.txt**

"Information Resources in Virtual Reality"
ftp site: **ftp.u.washington.edu**
Directory: **public/VirtualReality/HITL/papers/tech-reports**
Filename: **irvr.txt**

"What is Virtual Reality? A Homebrew Introduction and Information Resources List"
ftp site : **ftp.u.washington.edu**
Directory: **public/virtual-worlds/papers**
Filename: **whatisvr.txt**

"A Conceptual Basis for Educational Applications of Virtual Reality"
ftp site: **ftp.u.washington.edu**
Directory: **public/VirtualReality/HITL/papers/tech-reports**
Filename: **winn-B-93-9.txt**

"Learning in Virtual Reality"
ftp site: **ftp.u.washington.edu**
Directory: **public/VirtualReality/HITL/papers/tech-reports**
Filename: **brickenw-m-90-5.txt**

"Summer Students in Virtual Reality: A Pilot Study on Educational Applications of VR Technology"
ftp site: **ftp.u.washington.edu**
Directory: **public/VirtualReality/HITL/papers/tech-reports**
Filename: **brickenw-m-92-1.txt**

FTP tip: When changing directories at an ftp site you have to use "/" not the usual backslash "\" . Be sure to note that people should use **anonymous** as their name, and their **E-mail address** for the password (the E-mail address for the password is a common courtesy on the internet).

There are many discussion groups on Virtual Reality.

USENET Newsgroup **sci.virtual-worlds** is a USENET discussion group run out of HITL. Discussion centers on events in the VR community, technical issues with VR development, and applications of VR.

CompuServe Discussion Groups are under **go cyberforum.** Members of CompuServe can discuss all aspects of VR with CompuServe members. The whole forum is specifically dedicated to the discussion of VR and covers all aspects from social issues to development. Members of CompuServe can also access the Educational Research Forum by **go edresearch**. The Educational Research Forum has set aside a section to exchange research information and discuss VR.

Hypermedia on Internet

hyperedu stands for hypertext in education. The purpose of the list is to promote a discussion about use of hypertexts and hypermedia in education and in particular the advantages versus disadvantages of the introduction of these tools at any educational level (from elementary school to college). Other topics of interest are problems connected with **interfaces** and **networks**.

This list is not primarily interested in technical questions: for these problems you can subscribe to other lists such as **toolb-l** (for Toolbook users) or **hypcrd** (for *HyperCard* users). The discussion will be held in Italian but contributions in English and French are welcome. The list owner would be pleased if you could post to the list (or send privately to her for distribution among the subscribers) any information you come across through books, magazines, people, E-mail lists that you judge relevant to HYPEREDU.

Using the list. To subscribe to HYPEREDU send the following command to **listserv@itocsivm.cslit** or **listserv@itocsivm** on BITNET with the following in the body of the E-mail:

Sub Hyperedu yourfirstname yourlastname
For example: sub hyperedu Anni Mation
To send a message to the list, send the message to:
hyperedu@itocsivm.cslit
To leave the list, send a message to
listserv@itocsivm.cslit
containing the line:
signoff hyperedu

Keep Me Informed!

If you get interesting postings, listserv discussions, E-mail, or Internet resources concerning hypermedia, multimedia, or virtual reality, I'll post them in this column. We can't all join all the listservs or we'd end up with hundreds of messages each day. Instead, forward the "juicy stuff" to me and I'll edit and post it each quarter for you! I haven't had a chance to try all these resources, so let me know if they work and what you think!

Thanks to the following people for their comments, contributions, and forwarded notes:

Vickie L. Banks (21602VB@msu.edu)
Steve Bonham (sbonham@moe.coe.uga.edu)
Scott Fritz (scott@more.net)
Larry Johnson (ljohnson.ucs@smtp.usi.edu)
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Greg Taylor (taylor.381@osu.edu)
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Survey Results

Annette Lamb

A survey was included in the fall issue of *HyperNEXUS*. My mailbox didn't overflow with responses. On the other hand, we did receive some interesting comments.

The results indicated that our readers aren't really interested in quantitative research anyway, I'll keep the statistics simple and go for the comments. We received 20 surveys back, so keep that in mind as you read on. Also, remember that people checked all those that applied.

Who Are We and What Do We Do?

Our first question asked where people were involved with hypermedia/multimedia. It's clear that a majority of our readers are in the K-12 setting.

16 Middle School/High School Education
14 Preschool/Elementary Education
10 Multimedia Development
8 Higher Education
5 Training and Development
3 Other Adult Education

Next, readers were asked to rate themselves as hypermedia/multimedia developers. A majority of our readers appear to be at an intermediate level.

10 Intermediate
5 Advanced
4 Novice
1 Expert

Readers were then asked about their primary interests related to hypermedia/multimedia. Every respondent indicated that they were involved with training other people to integrate technology into their classrooms. Most were also involved with selecting and using resources.

20 Training people to integrate into their classrooms
15 Selector/Evaluate/Purchase
14 User
14 Applications and ideas for my students/users
4 Developer
3 Training people to develop
2 Researcher

What Resources Do We Use?

There has always been a great debate about platforms for hypermedia and multimedia. Our respondents overwhelmingly indicated that they were "Mac People." On the other hand, most are "multi-platform" users.

19 Macintosh
16 Chose more than one option
10 IBM with *Windows*
6 IBM or compatible with DOS
3 Apple GS
1 Mainframe

The next three questions were open-ended. Respondents were asked what hypermedia/multimedia packages and utilities they use regulary. *HyperCard* was clearly the most popular package. *HyperStudio* for the Mac came in a close second. This is very interesting considering *HyperStudio* has been available for less than a year.

17 *HyperCard*
10 *QuickTime*
10 *HyperStudio*
5 *LinkWay*
5 *Adobe Premiere*
4 *Macromind Director*
3 *Persuasion*
3 *PowerPoint*
2 *Screenplay GS*
2 *Authority*
2 *Toolbook*
1 *Astound, Visual Basic, Future Basic, AppleScript, Authorware, VideoShop, VideoFusion, KidPIX, HyperScan*

Respondents were also asked about the hypermedia/multimedia resources/peripherals they used. There was a wide range of resources mentioned. CD-ROM is the technology that has "taken off" during the past couple years. Laserdisc technology still seems to be going strong.

19 CD-ROM
14 Laserdisc
10 Digitized video or videotape
5 Scanner
1 hard drive, optical drive, printer, modem, LCD, bar coding, CD-I

What Do People Read?

The next question asked respondents to discuss their favorite hypermedia/multimedia books and resources. One person said, "I learned most of what I know from my colleagues." That's a nice sentiment! Many people simply wrote, "All ISTE publications." It was good to see many people wrote in HyperNEXUS. Danny Goodman's *Complete HyperCard Handbook* got by far the most votes. Although some were mentioned a number of times, I've just created a short list in alphabetical order. Most of the citations were incomplete, so I've just included authors and titles.

Abramson. *LinkWay*
Ambron & Hooper. *Interactive Multimedia*
Beekman. *HyperCard*
The Computing Teacher
ED-MEDIA Conference
Electronic Learning
Goodman. *The Complete AppleScript Handbook*

Goodman. *The Complete HyperCard Handbook*
Goodman. *HyperCard Developer's Guide*
Greenberger. *Multimedia in Review*
HyperNEXUS
ISTE Publications
Lamb, A. *IBM LinkWay Authoring Tool*
Lamb, A. & Myer, D. *HyperCard Creativity Tool*
MacAcademy. HyperCard Videos
MACUL Newsletter
Media and Methods
Myers, D. & Lamb, A. *HyperCard Authoring Tool*
NECC Conference
Schafer. *The Complete Book of HyperTalk*
Swaine. *HyperTalk Handbook*
Syllabus
Technology and Learning
THE Journal
Winkler. *HyperTalk: The Book*

What Do People Want In HyperNEXUS?

The next section of the survey dealt with *HyperNEXUS*. Readers were asked what articles they read, which they prefer, and what areas need to be expanded. Over half of the respondents indicated that they actually read *HyperNEXUS* cover to cover! The results of the areas that people would like to see expanded are listed.

18 Practical classroom applications: K-12
9 Feature Articles
9 Authoring Tool Tips for Use
7 Cheat Sheets
7 Hardware/Software Update
7 Desing of instructional projects

The other sections got 4 or fewer votes.

What Comments Do People Have?

The next section asked for ideas to expand *HyperNEXUS*. We got some interesting suggestions and ideas. Here are some of the comments:

> This was my first issue. I love it!! It hitches into my graduate work reinforcing my ideas and knowledge. The "cheat sheet" will be used this week with my students!
>
> Would prefer more application oriented articles rather than research oriented. Also, more article and discussion around other development tools than *HyperCard*.
>
> I thought the Summer '93 issue was fabulous. Several of the issues were perfect for my use. I especially liked the *HyperStudio* Cheat Sheet as I am new to *HyperStudio*. Please keep these *HyperStudio* ideas coming. I was disappointed with the Fall 93 issue—too technical.
>
> My interests lie with day-to-day practical utilization of design and development information.
>
> I need to know about conferences and other opportunities to expand my knowledge.
>
> We need hands-on applications.
>
> I would like to see projects by teachers and integration of hypermedia in the curriculum. Tips for *HyperCard* and *Toolbook* scripting would be great.
>
> I want ideas I can glean easily and quickly translate to teachers, not... research-based articles.
>
> More practical applications and classroom integration ideas of hypermedia/multimedia.
>
> Many public educators in Canada and the US have access to minimal equipment. Ideas on how to make the most with the least are valuable to us.
>
> We need "how to" and "why" articles.
>
> Why not distribute this journal as a *HyperCard* stack?
>
> How about Kodak CDROM inclusion ideas, QuickTime movies, and designing Kiosks.
>
> We need more beginner stuff.
>
> We need information on how to manage a classroom in a hypermedia project.
>
> I want to read about how hypermedia changes and improves the learning process.
>
> I'd like to see cases of developing and using multimedia in teaching. Also information on graphic design/interface design principles.

Survey Update

If you agree, disagree, or simply don't feel that the survey covered your perspective, you've got another chance to respond. If you'd like to add your two cents worth, send me the answers to the questions above. I'll post an update in the Fall issue!

Call for Papers

You've just read about what our reader would like to see in *HyperNEXUS*. Now it's your turn! What would you like to write about? How about a practical application of hypermedia/multimedia in the classroom?

Hypermedia/Multimedia Tidbits

Edited by Annette Lamb
(from HyperNEXUS readers)

The readers who completed the survey in the fall issue didn't realize that their contributions would be the beginning of this exciting new column called Hypermedia/Multimedia Tidbits. Here are some of the ideas they provided.

Reader Tidbit: I've yet to see any media that I can't import into *HyperStudio*! Photo CDs, laserdisc images... everything, and all the neat tools for design!

Editor's Note: I agree and I'll add QuickTake pictures, live video, videotapes, and any other multimedia element I can think of can be imported into *HyperStudio*!

Reader Tidbit: I've found that training teachers in the use of hypermedia increases student usage of this medium!

Reader Tidbit: The key to success is user's motivation. Anything one can do to influence this in a positive direction can aid exposure, attention, and thus, we believe, learning!

Editor's Note: You're right. It would be great if every teacher would send me a sample of their students' work!

Reader Tidbit: Watch out for a *HyperCard* virus called Merry Xmas!

Editor's Note: Does anyone know of other multimedia viruses we should be concerned about?

Reader Tidbit: The sophistication and top dollar cost of the hardware/software is not necessarily the answer to the courseware need; the sophistication of the skills of the developer do represent the answer!

Editor's Note: This is my favorite tidbit of the column! This fits well with my personal tidbit, "Boring is boring. Hypermedia/multimedia tools can't help boring content or poor instruction." We need more articles on practical instructional design issues and examples related to creating effective, efficient, and appealing courseware.

Reader Tidbit: Eighth graders were assigned novels (to read in English class) by authors who wrote about events and characters of the 1900s - 1930s. They organized a 30-minute small group presentation of their novels covering background information o the author, historical time period, culture and customs of the people. Presentations included skits, mini-lectures and multimedia presentations done with *HyperStudio* for the Mac. Students designed multicard presentations including text, graphics, scanned picture, freehand drawing, music, and spoken text. This project lasted a quarter and the results were fascinating and informative to students and teachers alike!

***Linda Aubry**, Computer Coordinator, **Rita Kirsch**, English Teacher, St. Rose School, Perrysburg, OH.*

Editor's Note: That's a great project idea! Just think, if all 1,000 subscribers of *HyperNEXUS* just wrote one short paragraph like Linda Aubrey and Rita Kirsch did we'd have an endless supply of classroom ideas!

Editor's Conclusion

I'd like to thank all those people who took the time to write a tip at the end of their survey. I'd like to continue this column. Send me your tidbit either through E-mail or snail mail at the address below:

***Annette Lamb**, The University of Toledo, Educational Technology, 2801 W. Bancroft SM344, Toledo, OH 43606; ph. 419/537-4713; E-mail: alamb@uoft02.utoledo.edu.*

HyperExchange

Conference Announcement

Third Annual Conference on Multimedia in Education and Industry, Sponsored by the Association for Applied Interactive Multimedia

When: July 18 - July 23, 1994
Where: Charleston, South Carolina
Why: An Event and a Professional Development Association for Multimedia Practioners!
Cost: As little as $25.00 or as much as $595.00 for 3 hrs Graduate Credit

3 Day Preconference (Monday July 18 - Wednesday, July 20):

Sessions: "HyperCard Basics," "Multimedia Integration on Macs," "LinkWay - Basics," "ToolBook - Basics," "ToolBook - Advanced," "Development and Mastering CD-ROM Software."

Lab space is limited, register early, First come, First served. (offerings subject to cancellation based on enrollment and lab availability)

1 Day Sessions (Wednesday, July 20):

Sessions: "HyperCard Hall of Fame," "MM and Internet," "Publishing on the 'WEB'"

Opportunities for multimedia project sharing

For more information contact: davidb@citadel.edu or Briggs@citadel.edu.

Call for Papers and Reviewers

Hypermedia in Information Systems and Organizations
28th Annual Hawaii International Conference on System Science HICSS -28, Maui, Hawaii - January 3-6, 1995
Sponsored by ACM, IEEE, PRIISM , and the University of Hawaii

We are inviting papers for the minitrack on Hypermedia in Information Systems and Organizations, as part of the Information Systems Track at the 28th Hawaii International Conference on System Sciences (HICSS-28).

HICSS is the major forum for hypertext and hypermedia research focused on information systems and organizations.

Hypertext is the science of relationships. It is both a concept regarding "access" to information and a rapidly growing technology. Hypermedia lies at the crossroads of hypertext and multimedia. Augmenting the myriad of today's business applications with hypermedia functionality should result in new ways to view a system's knowledge and processes conceptually, to navigate among items of interest and analysis stages, to enhance a system's knowledge with comments and relationships, and to target information displays to individual users and their tasks. In addition, adding hypermedia to the structure and interface of global networks may increase the effectiveness of communicating among, and accessing information for, individuals and organizations.

Introducing hypermedia technology into information systems brings forth a number of organizational issues. How will the organization change with enhanced access to information and the new communication channels this facilitates? How will people's work practices be affected? How do we evaluate hypermedia's impact?

In this minitrack we explore the benefits and the challenges that arise as hypermedia support for information systems, global network services and work practices grows.

Papers submitted to this minitrack should relate to one of the following two focuses: organizational aspects (how hypertext and hypermedia impact individual, group and organizational processes) or information systems aspects (how hypertext and hypermedia impact on the effectiveness of management information systems). These focuses allow for a rich range of subject areas, as evidenced in the suggested topics section below. Note that papers may discuss technical details, but these should not constitute their main emphasis.

Selected papers from the HICSS-26 and HICSS-27 minitracks will appear in a special issue of the Journal of Organizational Computing. We plan a similar issue with selected papers from this minitrack.

Suggested topics include: Organizational Impact of Hypermedia; Hypermedia as an Enabling Technology; Impact of Hypermedia Models, Frameworks, Standards and Architectures; Integration of Hypermedia into Information Systems; Design and Development of Hypermedia-supported Applications; Economics of and Metrics for Hypermedia Support; Designing Networks to Support Hypermedia; Hypermedia as a Technique for: Representing, Accessing and Managing Knowledge and Information; Improving Training and Learning; Facilitating Teamwork and Collaboration, Improving Connectivity and Communications, Applications Addressing These Issues; The Hypermedia Industry: Experiences and Visions.

Overall Conference Aims and Scope: The HICSS conference provides a forum for the interchange of ideas, research results, development activities, and applications among academicians and practitioners in organizational and computer-based system sciences. The conference consists of tutorials, advanced seminars, presentations of accepted papers, open forums, task forces, and guest lectures. There is a high degree of interaction and discussion among the conference participants because the conference is conducted in a workshop-like setting. Information on other tracks and minitracks conclude this announcement.

For more information, contact the minitrack coordinators below.

Michael Bieber, New Jersey Institute of Technology, CIS Department, University Heights, Newark, NJ 07102-1982 USA; ph. 212/998-0833; fax 201/596-5777; E-mail: bieber@cis.njit.edu. ***Tomas Isakowitz,*** *New York University, Information Systems Department, 44 West 4th Street, New York, NY 10012-1126 USA; ph. 212 995-4228; E-mail: tomas@stern.nyu.edu.*

Feel free contact either of us with questions on this minitrack! Authors unfamiliar with HICSS or who wish additional guidance are encouraged to contact any of the coordinators listed at the conclusion of this announcement.

Submission Process:

6/01/94 Send 6 copies of the manuscript to Tomas Isakowitz
8/31/94 Notification of acceptance to authors
10/03/94 Registration
10/04/94 Camera-ready manuscripts due
11/15/94 All other conference and hotel registrations must be received

The conference organizers are also looking for reviewers. If you'd like to be a reviewer, contact one of the people cited in this notice.

Other Tracks:

The Hypermedia in Information Systems and Organizations Minitrack is part of the Information Systems Track. There are three other major tracks in the conference: Architecture, Software Technology and Biotechnology Computing. Contact: Jay F. Nunamaker, Jr. at nunamaker@bpa.arizona.edu or Ralph H. Sprague, Jr. at sprague@uhunix.uhcc.hawaii.edu.

National Conference to Address Educational Multimedia Development and Copyright

In response to the growing concerns about copyright on the part of faculty and students developing their own multimedia programs for educational uses, the Consortium of College and University Media Centers (CCUMC) and the Agency for Instructional Technology (AIT) are planning a national conference on June 15-17, 1994, at American University in Washington, DC. The Educational Fair Access and the New Media National Conference will, for the first time, bring together major interest groups and a host of copyright experts to address these concerns.

Approximately 90 national associations, representing educational, governmental, and commercial interests have been invited to participate, along with observers from leading professional publications. Among those making formal presentations will be Barbara Ringer, Acting Register of Copyrights, United States Copyright Office; Robert Heterick, President, EDUCOM; Professor Fred T. Hofstetter, Director of Instructional Technology Center, University of Delaware; Robert Wedgeworth, University Librarian, University of Illinois/Champaign-Urbana; Michael Ribaudo, University Dean of Instructional Technology and Industry and Government Partnerships, City University of New York; and Bernard R. Sorkin, Senior Counsel, Time-Warner, Inc. representing the Motion Picture Association of America.

Participants will hear several formal presentations, in addition to those named above, and will work in small groups to begin the process of developing fair use guidelines for the use of copyrighted works in multimedia programs produced by faculty and students for educational purposes. Several demonstrations of the new technology will be conducted during the course of a reception scheduled to be held the first evening of the conference.

Complete Conference Proceedings will be published by AIT. AIT is a nonprofit U.S.-Canadian corporation established in 1962. Its mission is to foster learning by developing, acquiring, and distributing quality electronic technology-based resources and services; and by providing leadership to the educational community.

CCUMC is a 300-member professional education association representing 184 institutions and more than 30 educational media and computer software producers and distributors. The association is committed to developing standards for the effective implementation and management of instructional media in higher education.

Hypertext Teaching Module

The Meningitis Epidemic Case Study is a hypertext teaching module available by anonymous ftp. The Meningitis Epidemic Case Study is a computer assisted learning module developed with information collected during an epidemic in Africa. The module is user friendly and users not familiar with computers need only a short introduction to master the skills required. The module is fully described in: Cuevas LE, Moody JB, Macfarlane SBJ, Rada R, Ghaoui C. (1993). "The use of hypertext to demonstrate the methods of investigating an epidemic of meningitis," *Medical Education*, Vol 27, pages 91-96.

The authors welcome comments and suggestions concerning both the academic content and the hypertext features of the module. Such comments can be sent by post or E-mail to the address below. The aims of the module are to familiarize the user with the epidemiology of epidemic bacterial meningitis in Africa and to practice with a real life problem of diagnosing an epidemic of bacterial meningitis with limited sources of information.

Computer requirements: IBM compatible PC with at least 540Kb of free RAM, a hard disk with at least 1.5 Mb free space, mouse and EGA (or better) colour graphics adaptor.

Software: The module was developed using the hypertext software *LinkWay* and the release version of the Meningitis Epidemic Case Study uses a special read-only module, allowing applications to be freely distributed.

Distribution: The software is available by anonymous ftp from ftp.liv.ac.uk in the directory ftp/pub/epidemic. The package is distributed in compressed form together with the uncompression software epidemic.zip, the compressed version of the module epinst.bat, and the installation batch file unzip.exe (public domain uncompression software).

Files containing a database of the information collected about the epidemic, in Epi-Info format, are copied to the Epi Info directory—assumed to be C:\EPI5. Epi Info is available by FTP from the SIMTEL archives at oak.oakland.edu and other mirror sites in the pub/statistics directory.

Software prepared and distributed by The Liverpool Epidemiology Programme, Liverpool School of Tropical Medicine, Pembroke Place, Liverpool L3 5QA UK, E-mail mt04@liverpool.ac.uk

Editor's Note: These items were all forwarded to me through Internet. If you come across interesting information you'd like to share, forward them to me at alamb@uoft02.utoledo.edu. Of course, you can always use snail mail: Annette Lamb, University of Toledo, 2801 W Bancroft, SM 344, Toledo, Ohio 43606.

Cheat Sheet

by James Lindeman

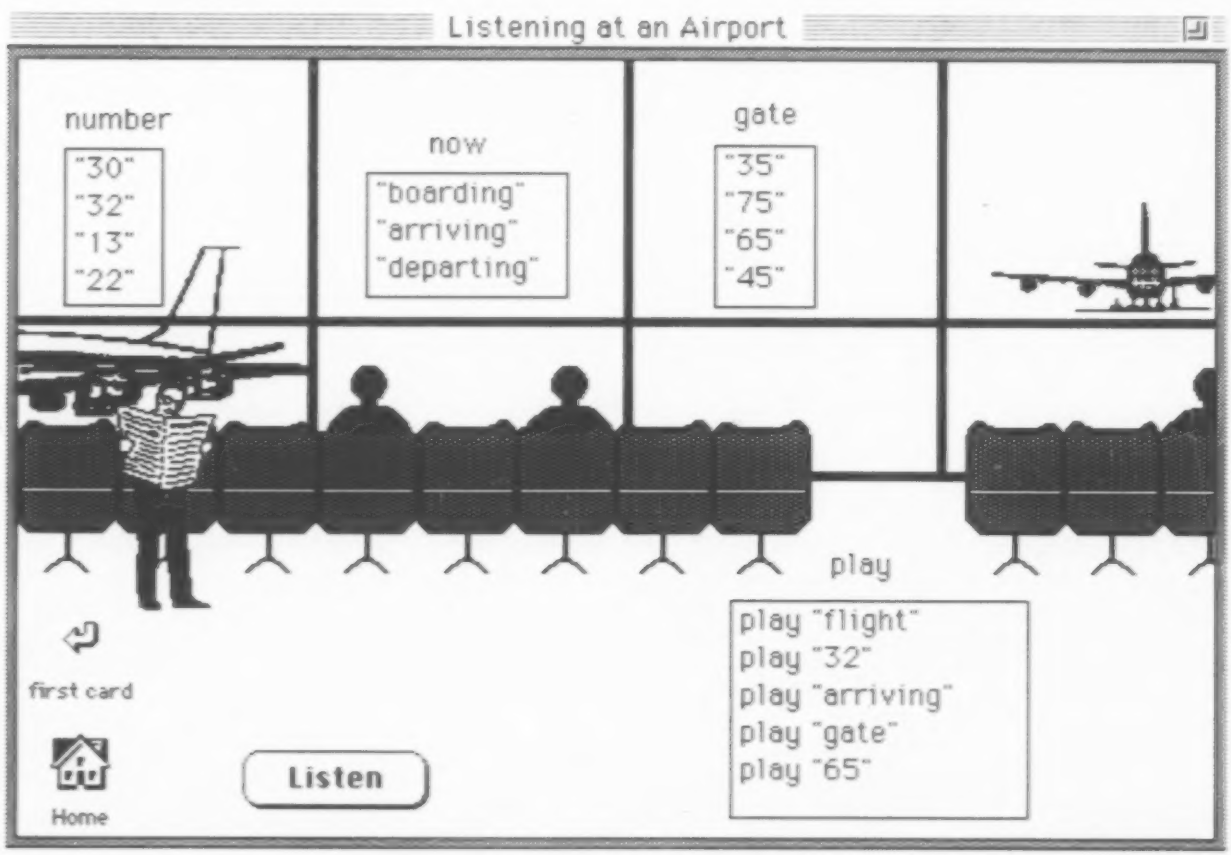
Audio & HyperCard: Listening at an Airport

Part 1: Cuing Sounds in HyperCard

HyperCard's ability to line-up sound resources and then later play them as one smooth audio sequence can be very useful for creating programs for listening practice and language pattern recognition. This is not at all complicated, especially if you keep your first attempt simple. You need only a basic knowledge of *HyperCard*, a tiny bit of experience with *HyperTalk*, some means of recording sound into your stacks, and about two hours of uninterrupted time. Let's go through the process step by step:

1. Select a language situation and identify a vocabulary. This could be any of the typical situations which are taught in language conversation classes: introductions, making appointments, ordering at a restaurant, and so on. In this example we will use the situation of listening for announcements at an airport. The vocabulary here is very focused and limited, and that's just what we want. Our goal is to give students a listening environment which mimics a specific real life situation, and help them to become comfortable with it. Choose the target vocabulary carefully and simplify it as much as possible.

2. Record as separate sound resources each structural element of speech. In our example we will be using this structure: "Flight (flight number) (Now Arriving / Departing / Boarding) at gate (gate number)." "Flight" and "at gate" are recorded once, the flight number is recorded several times as different numbers; "Now Arriving" is recorded once, "Now Departing" is recorded once, and



"Now Boarding" is recorded once; "at gate" is recorded once, and the gate number is recorded several times as different numbers. Remember to record each sound with a natural flow of speech in mind. For example, in English we often hear an "ahhh..." or similar sound to indicate that we are not finished talking yet. In many cases this will make the final result sound more realistic to the ear. It's also a good idea to say a few sample sentences out loud to yourself before you record the individual sounds, taking note of rising and falling intonations which should be recreated in the recordings.

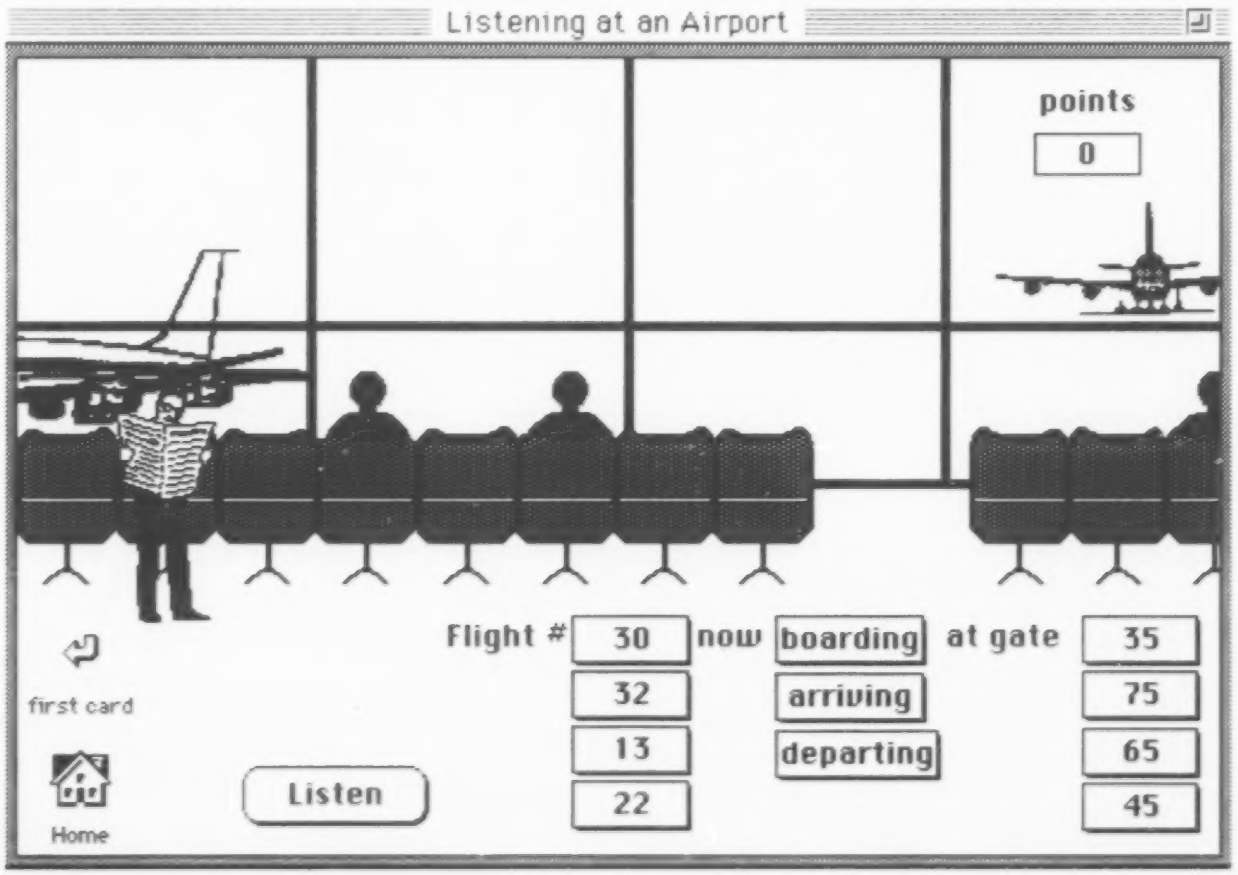
3. Put the names of your recorded sounds into categorically separate card fields. Create four card fields as in Figure 1. These fields are given the names, "Number," "Now," "Gate," and "Play." Enter the names of your recorded sounds. When you are finished building the stack, these fields will be hidden using the following commands: Hide card field "Number," Hide card field "Now," Hide card field "Gate," and Hide card field "Play." You can send these commands from *HyperCard's* message box, or create a temporary button with this script.

4. Have *HyperCard* line up a sentence to play by selecting lines at random from those fields. Create a card button named "Listen" and give it the following script:

```
on mouseUp
   - to get at random any line of card field "Number"
   get any line of card field "Number"
   - to put the sound of the number to play into¬
      the correct line (and in the correct format)

   into field "Play"  (Notice that the word "play"¬
      and ,"&&" are needed here)
   put "play" && it into line two of card field¬
      "play"
   - these next 4 lines cue the other random sounds¬
      in the same fashion
   get any line of card field "now"
   put "play" && it into line three of card field¬
      "play"
   get any line of card field "gate"
   put "play" && it into line five of card field¬
      "play"
   - to play the entire sequence of sounds
   do card field "Play"
end mouseUp
```

Now you are ready to try it out. Click the "Listen" button repeatedly and check out how each sentence sounds. You may need to edit some



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sounds a little to make them work better together, but probably you will be surprised at how smoothly the sentences are played back with your first attempt. Congratulations; using less than 10 lines of *HyperTalk*, you have created a fairly sophisticated audio tool. Before you experiment more with this technique, however, you will want to make an interface for student responses and for checking and scoring their answers. That is what we will do in part 2.

Part 2: Student Interface

There are many possible ways to check for correct student responses in a *HyperCard* stack. Working with our "Listening at an Airport" stack we will use a rather simple method involving buttons. This may not always prove the best or most effective way to design your stack, but once you have seen how this method works you should have an understanding which you can expand upon later. In Part 1 we created some card fields to contain the names of the sounds which are used in the stack. You can now hide those card fields, as described in Part 1, by using the "Hide" command from the message box. Next, make a small card field for containing the students score. Label it "Score" using the paint text tool. Also using the paint text tool, write the framework for the sentence the students are listening for, leaving blank spaces for the sounds which are chosen at random. Create a new button and name it the same as one of the numbered sounds. Give the button this script:

```
on mouseUp
   get line two of card field "play"
   if it contains the short name of me then
   add 1 to field "points"
   play harpsichord "b"
   --(or any other sound you want to play for a¬
      correct answer)
   end if
   put the short name of me into card field¬
      "coverNumber"
   show card field "coverNumber"
end mouseUp
```

Using the button tool with the Option and Shift keys pressed, click and drag the button you just made and make a copy of it below it. Repeat this procedure for as many sounds as you have in card field "Number" and set the name of each button to those numbers.

Make a new button in the space for the "Now" sound. Give it this similar script (bold print indicates the words that have changed):

```
   get line three of card field "play"
   if it contains the short name of me then
      add 1 to field "points"
   play harpsichord "b"
   end if
   put the short name of me into card field
      "coverNow"
   show card field "coverNow"
end mouseUp
```

Again, copy this button using button tool with the Option and Shift keys pressed, and change the names of the buttons as in the illustration. In the space for the gate number, create a button and give it this script:

```
on mouseUp
   get line five of card field "play"
   if it contains the short name of me then
   add 1 to field "points"
   play harpsichord "b"
   end if
   put the short name of me into card field¬
      "coverAll"
   show card field "coverAll"
   show card button "Listen"
end mouseUp
```

Again, copy this button using button tool with the Option and Shift keys pressed, and change the names of the buttons as in the illustration. Next we will make some opaque fields to cover each set of buttons as the buttons are clicked. Make a card field just large enough to cover the first set of buttons, name it "coverNumber" and choose an opaque type field with the text "locked." Copy and change the size of this field for the next set of buttons and rename it "coverNow." Again copy and change the size of this field so that it covers all of the buttons as well as the sentence above the buttons, and rename it "coverAll." We now need to make a small change to the "Listen" button: open the script of the button and add the three lines that are in bold print:

```
on mouseUp
   -- to get at random any line of card field ¬
      "Number"
  get any line of card field "Number"
   -- to put the sound of the number to play into
      the¬ correct line (and in the correct format)
   into field "Play"  (Notice that the word "play"¬
      and  "&&" are needed here)
   put "play" && it into line two of card field¬
      "play"
   -- these next 4 lines cue the other random sounds¬
      in the same fashion
   get any line of card field "now"
   put "play" && it into line three of card field¬
      "play"
   get any line of card field "gate"
   put "play" && it into line five of card field¬
      "play"
   hide card field "coverAll"
   hide card field "coverNumber"
   hide card field "coverNow"
   -- to play the entire sequence of sounds
      do card field "Play"
end mouseUp
```

When the "Listen" button is pressed now, the card should appear as in Figure 2. After the answer buttons are clicked, the score will be recorded and the screen will be cleared of answer buttons in preparation for the next listening practice. One final step: give the card a script to empty the score when the card is opened:

```
on openCard
   put empty into card field "score"
end openCard
```

That is as far as we will go with our example. Of course you may want to add a title card, or, after you have created a number of listening situations, an index with buttons taking you to the different cards depicting each situation (you can copy the first card you've made and simply change the graphics and the names of the sounds and buttons). If you do decide to make a stack with more than one listening situation, though, remember to keep an eye on the amount of memory your recorded sounds use so that you can keep your stack size small enough to fit on a single floppy disk. And by the way, especially if your target language is English, I'd appreciate seeing what you come up with!

James Lindeman *is at Akenohoshi Junior College, Namiuchi 2-Chome 6-32, Aomori-shi 030, Japan.*

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Introduction to MicroWorlds—A Logo-Based Hypermedia Environment

Sharon Yoder

MicroWorlds is an application that offers in a single program many of the appealing features seen *Kid Pix*, *HyperCard*, and *LogoWriter*. Learn to use *MicroWorlds* objects such as turtles, buttons, text boxes, and sliders to integrate graphics, color, sound, music, and text into computer-generated projects. Each chapter includes tips and techniques, activities, and self-assessment. Appendices contain a list of all the Logo primitives available in *MicroWorlds*.

Way of the Ferret—Finding Educational Resources on the Internet

Judi Harris

Based on Judi Harris' popular Mining the Internet column in *The Computing Teacher* journal, *Way of the Ferret* is designed to help you acquire the knowledge, skills, and experience necessary to locate and use resources found on the Internet. Carefully developed analogies help users grasp basics of Telnet sessions, FTP file transfers, information location tools, file encryption, and discussion groups. Finally, 15 different types of educational telecomputing activities help you plan for integrating Internet resources into your students' academic explorations. Two appendices cover recommended Telnet sites and FTP archives for precollege use.

HyperStudio in One Hour

Vicki Sharp

Learn how to create a four-card stack step by step in *HyperStudio* for the Macintosh. Through the creation of each card, you learn different skills: adding borders and graphics, creating buttons to link cards and control sounds, and using the paint tools. Additional topics include how to do animations, access *QuickTime* movies and videodisc players, and work with color. Sample teacher and student stacks will help you get started on your own projects. The book includes a picture reference for the clip art that comes with *HyperStudio*, keyboard shortcuts, and an index. Lots of screen shots and easy-to-follow instructions make this an invaluable book for teaching/learning *HyperStudio*.

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Submit three copies of the manuscript, typed, double-spaced, and a copy on disk (Macintosh preferred—saved as an ASCII file, noting the computer brand and word processor used) to the publishing editor:

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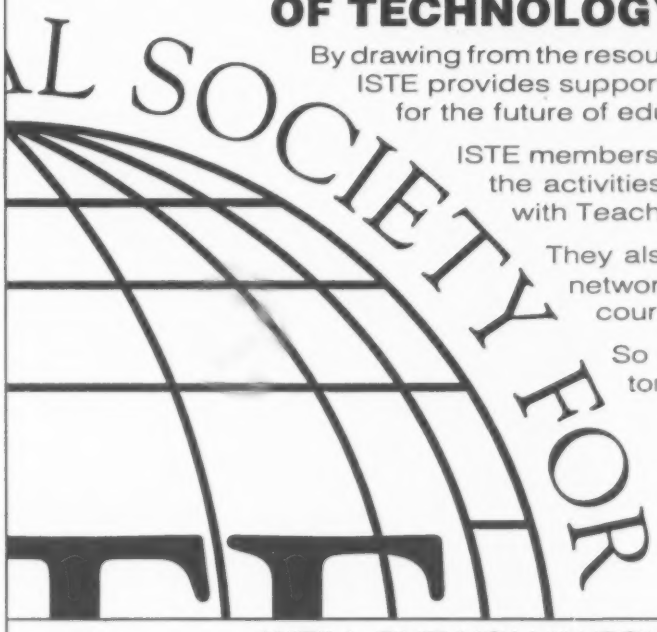

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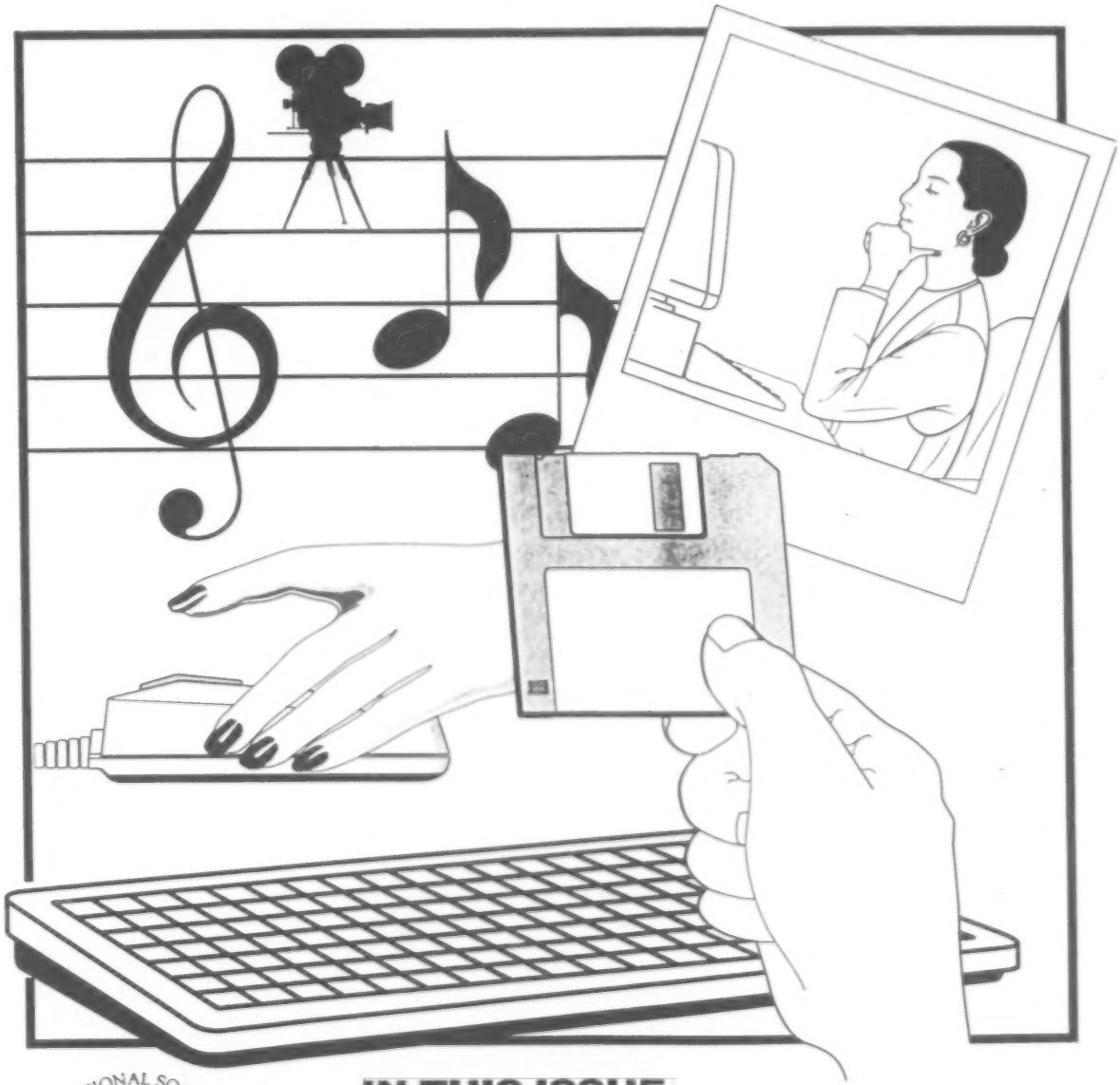
Journal of Hypermedia and Multimedia Studies

Volume 4, Number 4 Summer 1994



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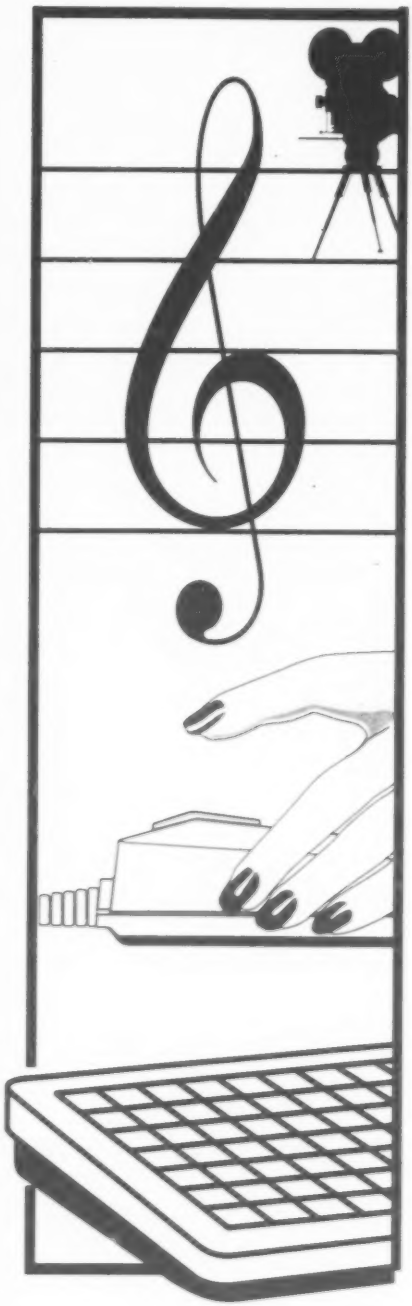

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A Word from the Editor

Annette Lamb

Change!

My word for this issue is *change*! Have you noticed that things change all the time? You just feel comfortable with a multimedia package, and a new version is released. You just get done paying for your home computer, and it's time to buy a new one. You finally locate the virtual reality equipment that seems perfect for your classroom, and something new comes out. Just when you make the decision between Mac and IBM, they start merging hardware and software. Change creates change (profound, huh?). Actually, I have to admit that I love change, and it's probably the main reason most of us love "the cutting edge" technology.

In keeping with my theme of change, I've got some professional changes to share with you. I've moved and changed jobs, so if you have things to submit for *HyperNexus* (I'm sure that article you've been meaning to write is almost ready, right?!), use the new address below:

Annette Lamb
University of Southern Indiana
Dept. of Teacher Education FA144
8600 University Blvd.
Evansville, IN 47712
812/465-7148
E-mail: aclamb.ucs@smtp.usi.edu

Change is also in the future for *HyperNexus*. Interest in virtual reality and the Internet is exploding. These two areas are closely allied with hypermedia and multimedia. We'll have articles related to both topics in this and future issues.

A Demand for Change

I demand (or beg for) another change. We need to get an issue ahead. This summer issue should arrive at the beginning of summer, not at the end. We need articles.

HyperNexus readers need an attitude adjustment. That means you! HyperNEXUS is an "interactive" publication. In other words, our readers also need to be writers. I know you can do it. We've found that the most popular articles are written by the people who have little experience with multimedia or writing, but have neat ideas for using technology in the classroom. Give it a try! If you don't want to write an article, at least send me a student stack with a couple paragraphs. I'll write the article, all you have to do is send some student work on disk! What a deal!

In This Issue

This issue has the variety that readers have been requesting. We've got ideas for beginning and advanced hypermedia and multimedia users, as well as a variety of software types. The issue begins with a message from our new HyperSIG chairperson. Our first feature written by Marcinkiewicz highlights the steps in creating a multimedia kiosk. His article traces the development of a faculty database featuring audio, still and motion video, and text information developed for a School of Education.

McLellan, our regular author on the topic of Virtual Reality, shares her experiences teaching courses in the area of virtual reality. Her resources will be extremely valuable for everyone interested in the topic.

Thanks to our chairperson, Paola Williams, our Internet Impact column is off to a great start. She shares Internet resources and ideas as well as calling for your participation in this regular column.

This issue contains two "In the Classroom" articles. Our first article features a practical elementary multimedia project. Whitmer shares his experiences working with primary grades on an annotated field trip incorporating *HyperStudio* and color video stills. The second article examines practical applications for the *QuickTake* camera.

The "Cheat Sheet" for this issue is on the topic of quiz creation in *HyperCard*. Benson guides readers through the development of a quiz stack.

Conclusion

Special thanks to all the authors who wrote articles for this issue. Next issue, I could be thanking *you*. I'm looking forward to receiving your ideas, articles, and resources at my new address. My new mail box is waiting for your snail mail!

A Message from the Chair

Paola Williams

Aloha from Hawaii...

For some of you, this summer issue may greet you as you return to your school to start a new year. I hope your summer was relaxing and rejuvenating, and that you learned something new and exciting you can share with your students, co-workers, and colleagues.

As the newly appointed chair of the HyperSIG, my official duties began at the 1994 NECC Conference in Boston. From all the pre-conference meetings, and workshops, and throughout the gala opening, excitement and energy were present. If you want to know how it all went, ask your colleagues who attended the conference to share a personal highlight.

At our annual "Birds-of-a Feather" meeting, we discussed the direction HyperSIG would like to take for the coming year, our commitment to the *HyperNexus* journal, and our goals for contributing to next year's NECC. Ideas and suggestions were well received, and members' questions were answered.

In order to provide a wide range of articles, *HyperNexus* needs your contributions. Please send us the great projects you are doing with your students. Tell us about an interesting software program you have explored. Are you taking courses in multimedia, virtual reality, of networking on the Internet? Have you read a great book about hypermedia? These are all potential articles we would like to include in a future issue of *HyperNexus*.

Let us know how HyperSIG can help you. How can we best serve your needs, your students needs, and the community of educators developing and using multimedia/hypermedia in your school, university, or workplace.

I am looking forward to the coming year and would love to hear from you. Below are my physical address (snail mail) and my E-mail address (best is by E-mail).

***Paola Williams**, Punahou School, Honolulu, Hawaii, 96825, E-mail: pwilliam@uhunix.uhcc.hawaii.edu.*

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Adobe Premiere for Macintosh—Classroom in a Book

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These lessons, with special projects mixed in, cover introducing *Macromind* and video terminology; the construction window; working with sound; adding titles; adding rolling credits to clip; modifying sound and images by rotoscoping; advanced editing features; capturing digital video and using compression; and creating videotape as output from *Premiere*. Grades 10-adult (ages 15-adult).

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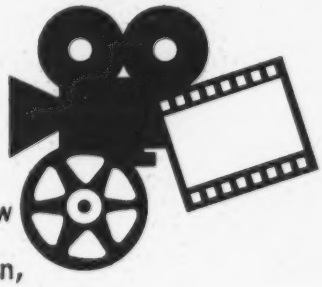

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Developing a Kiosk: A Multimedia Database

Henryk R. Marcinkiewicz

What is a kiosk?

A kiosk is a reference tool that uses multiple media to display information—a multimedia database. Earlier familiar forms of kiosks can be found on university campuses. They are also commonplace in European cities. They are the boards or wide cylinders on which public notices are posted. Since computers excel in the storage and speed of access of information, they are employed in the operation of electronic kiosks. One type of electronic kiosk can be found in shopping centers where shoppers are directed through the mall—select the type of business you want and a screen changes to display the information you need. The electronic kiosk is being adapted for a variety of uses because of what it does; it makes a variety of information available at one source. When we consider that a lot of our dealings concern the access and display of data, the use of a kiosk may make a lot of sense. Some topics for kiosks might include the students in a class, new students in a dormitory, a catalog of a basketball team, the places of interest in your town, or student portfolios. The plan for the kiosk that is described here was for the School of Education Faculty at the University of South Dakota. The School's center for Interactive Technology for Education and Corporations (InTEC) undertook the design and development of the faculty kiosk. The purpose was to familiarize prospective students, as well as visitors to the School, with the faculty.

Why develop a kiosk?

There are several factors you need to consider to help you decide if a kiosk is the appropriate database for your purposes. Here is a list of points we considered in deciding whether we wanted a kiosk. Our rationale and justifications are included.

1. Need—What is the justification for this project? Is it needed?
   - There is a perceived need for a medium that is a comprehensive, accessible and private summary of the faculty.
2. Purpose—What outcome do we expect of the viewers?
   - The product should inform viewers of the faculty and administrators, their respective divisions, and the special programs and projects at the School.
     i. Information should be more accessible in this medium than in the existing one. (The exiting comparable medium would be a university catalogue.)
     ii. Accessing information should be preferable from this medium than from the existing one.
     iii. Updating information should not require complete reproduction of the medium used. (This would be the case with a paper catalog.)
     iv. The number of people viewing it would not be restricted by the number of copies printed.
     v. The medium ought to have the potential for eventual distribution.
     vi. The mode of information ought to be varied, that is, include audio, and images as well as text.
   - Viewers should be impressed.
3. Audience—Who is this for?
   - Prospective students.
   - Those interested in familiarizing themselves with the faculty such as a certification board, new faculty, parents, or visitors.
4. Content—What aspects of the topic are most essential?
   - An image, a digitized photo of each faculty member's face
   - Something to read.
   - Sound, a digitized recording of each faculty member's name.
5. Interface—Will this be interactive? Why?(What do we expect the viewers to do with the medium?)
   - Interactivity will consist of navigating through the program. The viewers will familiarize themselves with the program structure, personnel of the School following the guiding structure of the program, but essentially navigating and pacing themselves through the information.
6. Equipment 1—What will be the target equipment used?
   - Storage—The kiosk occupied 15 megabytes of disk space.
     i. The digitized still images averaged 120K per still; total was 10MB.
     ii. The audio recordings averaged 40K per person; total was 2.4Mb.
     iii. The *HyperCard* stack occupied 2.7Mb.
   - Display.
     i. A Macintosh computer with a 68040 processor, for example a Quadra model 900 or a (formerly Centris) 610 displayed the kiosk at a usable pace. A slower processor displays the kiosk adequately but the rate at which a new screen is refreshed taxes the viewer's patience.
     ii. A color monitor that is usable with a Macintosh computer, preferably not the Apple 12" monitor since it displays fewer grades of color.
     iii. The built-in sound system on a Macintosh is adequate. External speakers would be better especially if the acoustics of the final destination of the kiosk are unpredictable. Voices are not always consistent in their volume.
7. Equipment 2—What equipment will be available for development?
   - A Super VHS camera.
   - A Quadra 950.
   - A microphone.
   - A VideoSpigot video capture board on the Quadra.
   - A PC VCR deck and a TV monitor.
8. Software—What applications will be available for development?
   - *HyperCard 2.1* for the kiosk database.
   - *HyperCard 2.1* for digitizing audio.
   - ColorizingHC external command which added the color function to the stack.
   - Screenplay for digitizing video.
   - Premier for digitizing video.
   - Photoshop for touching up images.

9. Evaluation—How will we know the kiosk works?...and was worth developing?
   - Pilot tests of the main screens will be done for navigability.
   - Pilot tests of the assembled prototype for navigability and accuracy and will be done.
   - Users' comments will be recorded over time.
10. Time—How long will it take to develop?
   - Data Collection, total time spanned about six months.
     i. Videotaping for images as well as audio averaged 10 per person.
     ii. Interviewing faculty and collecting information sheets averaged 30 minutes per person.
   - Editing data and developing the stack totaled approximately 200 hours.
11. Development—What needs to be done?
   - Mapping (users' flow through program).
   - Schedule for faculty.
   - Writing (questions for faculty).
   - Collecting data.
     i. video images (stills of faculty faces).
     ii. audio (faculty speaking own names).
     iii. text (menus, information on faculty, catalog info).
   - Editing the data.
   - Scripting the stack.
   - Entering the data into the stack.
   - Trying out the stack.
12. Cost—How much? What are the expenses?
   - Videotape: 4 SVHS cassettes were sufficient (about $20).
   - Two rolls of 35mm film for photographing back-up stills. (about $10).
   - Personnel costs depend on the institution. Estimate costs based on tasks to be done, the availability of skilled and knowledgeable personnel, and the extent of the project. Equipment costs also vary.

If you need to organize and provide navigation through data in a concise, speedy, private, but non-intrusive manner, then you may want to consider designing and developing a kiosk.

What about organization and navigation?

The design of the kiosk follows the *HyperCard* concept of a database as a stack of cards. There are four divisions at the School of Education, the kiosk stack was divided into four main parts—one for each division. Navigation through the stack is via buttons—you click a mouse on a screen image to access data. Refer to the flowchart or the outline for an illustration of the organization (see Figure 1).

The sequence of screens includes a title screen (see Figure 2), a credits screen (see Figure 3), and a main menu—or directory—that lists the four divisions (see Figure 4). On the latter screen there is a button which accesses directions for using the stack (see Figure 5). There is also a text search button allowing for specific searches of the textual database by typing in specific terms rather than by clicking the buttons to move

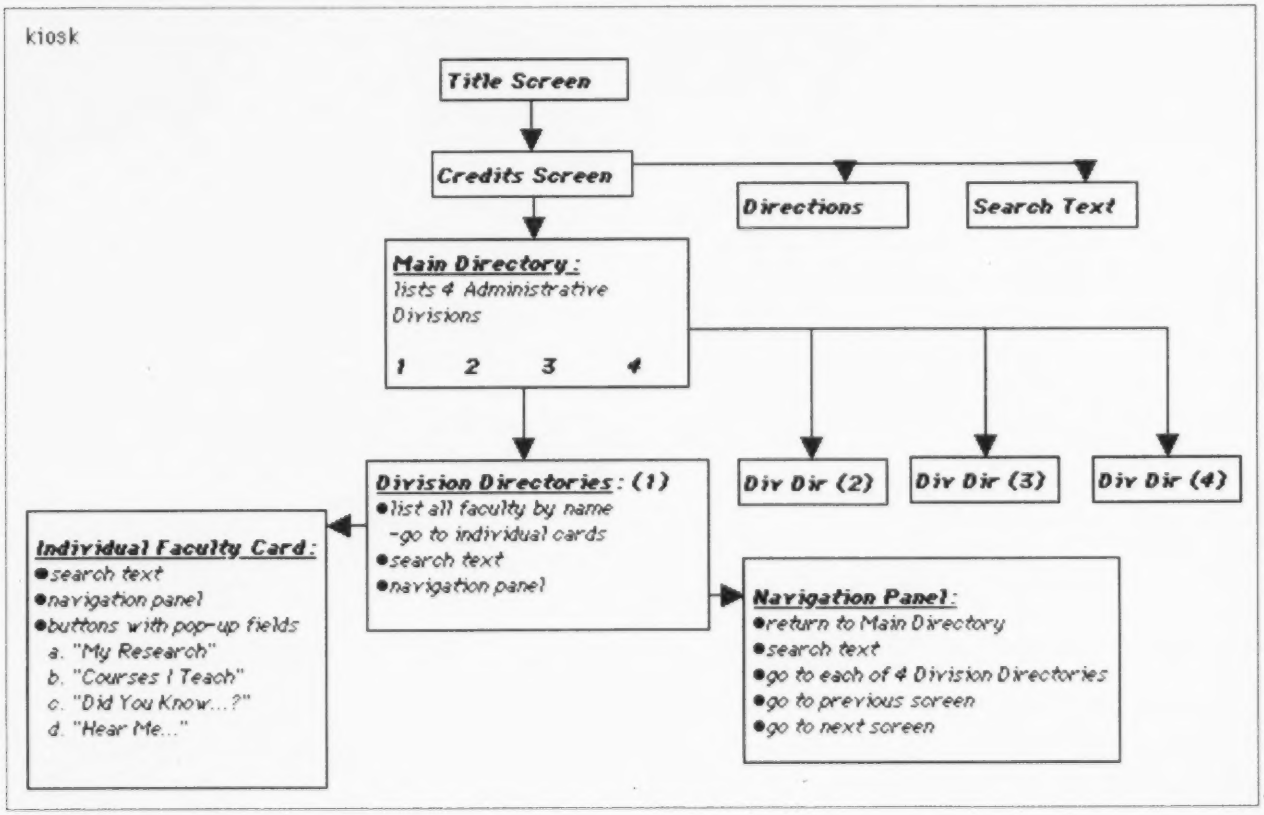

Figure 1.

Figure 2.

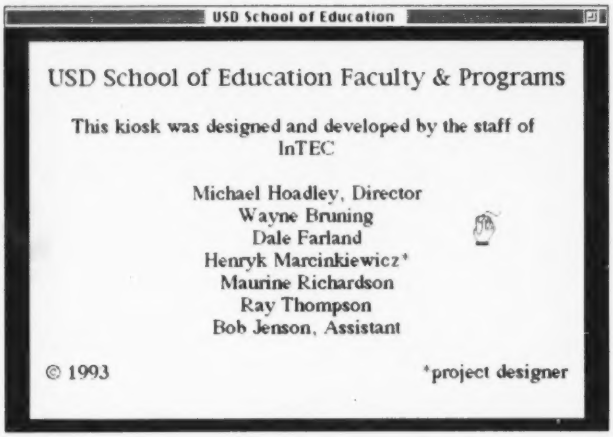

Figure 3.

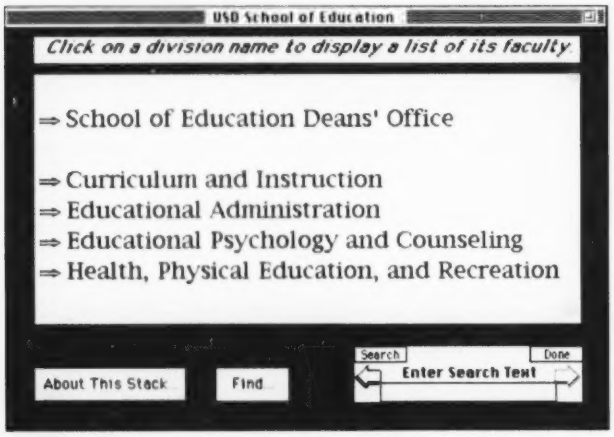
USD School of Education
Click on a division name to display a list of its faculty
⇒ School of Education Deans' Office
⇒ Curriculum and Instruction
⇒ Educational Administration
⇒ Educational Psychology and Counseling
⇒ Health, Physical Education, and Recreation
About This Stack
Find...
Search
Done
Enter Search Text

Figure 4.

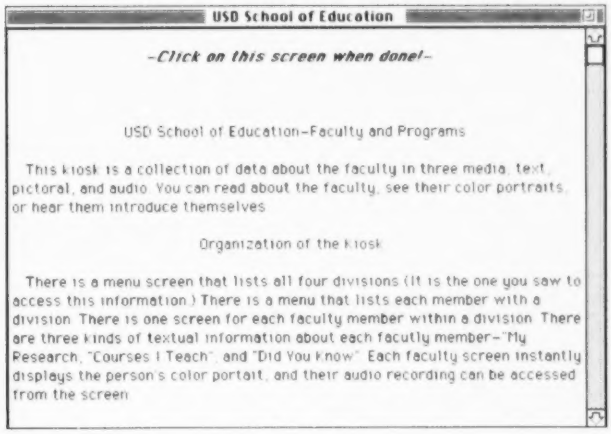
USD School of Education
-Click on this screen when done!-
USD School of Education–Faculty and Programs
This kiosk is a collection of data about the faculty in three media: text, pictoral, and audio. You can read about the faculty, see their color portraits, or hear them introduce themselves.
Organization of the kiosk
There is a menu screen that lists all four divisions (It is the one you saw to access this information.) There is a menu that lists each member with a division. There is one screen for each faculty member within a division. There are three kinds of textual information about each faculty member–"My Research," "Courses I Teach", and "Did You Know". Each faculty screen instantly displays the person's color portait, and their audio recording can be accessed from the screen.

Figure 5.

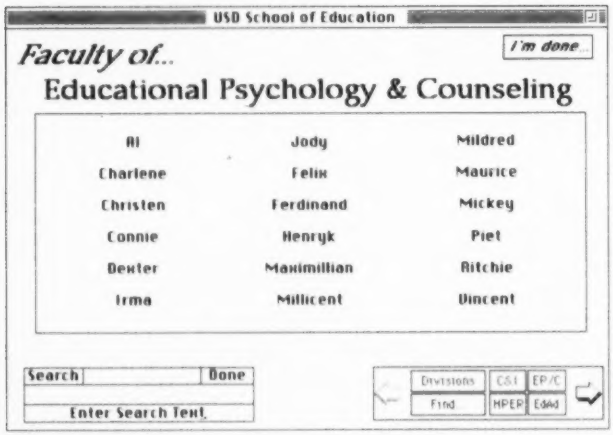

Figure 6.

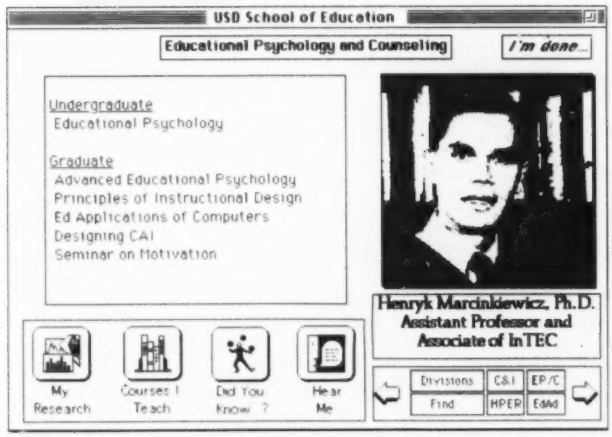

Figure 7.

Script 1. The Individual Faculty Card

```
on opencard
      lock screen
      colorizeHC "colorfill", "0,0,512,342",
      "48816,23337,65520"
      - Colors the background of the entire card.
      The first set of numbers are the
      - coordinates for the entire card. The
      second set of numbers are the RGB (Red,
      - Green, Blue) values of the color. This
      one happens to be a shade of purple. These
      - values can be identified from the Color
      Control Panel. Pull down the "Highlight"
      - menu and select "Other."
      colorizeHC "Erase", "130,6,380,27"
      -Erases the color from the space for the
      field for the division name.
      colorizeHC "Erase", "12,249,304,335"
      -Erases the color from the space for the
      field behind the information buttons.
      colorizeHC "Erase", "311,227,507,283"
      -Erases the color from the space for the
      field for the name plate.
      colorizeHC "Erase", "312,289,507,334"
      -Erases the color from the space for the
      field for the navigation menu.
      colorizeHC "Erase", "423,6,500,27"
      -Erases the color from the space for the
      field "I'm Done."
      picture "henryk m stl 2", file, shadow,
      false, 0
      -Alerts HyperCard to find and configure the
      display of a picture.
      set loc of window "henryk m stl 2" to
      "320,40"
      -Sets the location for displaying the
      picture.
      show window "henryk m stl 2" at "320,40"
      -Tells HyperCard to display the picture.
      set lockscreen to false
      pass opencard
end opencard

on closecard
      close window "henryk m stl 2"
      -Tells HyperCard to hide the window.
      colorizeHC "colorfill", "0,0,512,342",
      "48816,23337,65520"
      - Tells HyperCard to color in the spaces
      which had been erased.
      pass closecard
end closecard
```

through the stack structure. This search function is available throughout the stack.

Access to faculty data is first available via the division directories (see Figure 6). Once a division is selected, a card is displayed listing the names of the faculty. You either click on the "next screen" arrow to "page" through the alphabetical arrangement of faculty cards or on the person's name button on the division card.

Once a faculty card is invoked (see Figure 7), the person's 32-bit digitized color image is displayed along with a navigation box (that is repeated through the stack) and four buttons for accessing displays of other data. The buttons are entitled "My Research," "Courses I Teach," "Did You Know?" and "Hear Me." The first three display text on a field that appears alongside the color image and disappears when another button for text data is clicked or when the card is closed. The "Hear Me" button accesses a self-introduction recording.

In an effort to make the kiosk more attractive and organized, color was added to the stack. This feature was useful because each division within the School was assigned a distinguishing screen color.

How is a kiosk developed?

Collecting Data about the Faculty

Three forms of data were collected for each person. Textual data were gathered using response sheets. Images and audio were captured using a video camera. Several minutes of video were shot for each person and then digitized in two steps. One computer program was used to capture and convert the video from analog format to digital and store it on a hard disk drive. Another was used to touch-up images. The audio data were captured and edited using *HyperCard*.

How the Text Information Was Collected. Each individual faculty card displays three sets of text information about the particular member. They are the faculty member's research, the courses taught, and some personal items. The data are displayed on hidden fields that are displayed when the "My Research," "Courses I Teach," and "Did You Know?" buttons are clicked, respectively. Faculty responded to surveys, and their responses were entered into the fields. In order to offer faculty the opportunity to participate in the development of the project, to feel comfortable divulging personal information, and to ensure accuracy, interview sessions were scheduled so that faculty could be present when one of the developers entered data onto the kiosk. About half of the faculty took advantage of this procedure.

How the Images Were Captured. A Super VHS video camera was used in order to get the best quality sound and image, because the reproduction of sound and image tends to deteriorate their quality. Because multiple reproduction would likely be necessary, we started with the best quality we could get. Using a video camera to record audio saves the step of recording separately, allows for short movie clips if desired (these were not used since they would have just been "talking heads"), and builds an archive for later use. Each faculty member was videotaped. One video tape was used for each of four divisions.

The video tapes were played into the VideoSpigot video capture board on the Quadra 950. The procedures for the Screenplay video digitizing program were used, as were those for the Premiere video editing program. The former simply required that a frame be clicked on and dragged off of the Screenplay viewing screen. That action renders the frame as a still image. Using Premiere allows for more precise "frame grabbing" because it allows for stepping through the video segment. Most of the images used

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were captured with Screenplay. Once captured, an image was saved with a unique title into its appropriate folder. A separate folder 2. Use *Photoshop* to crop the images from the folder entitled, "Faculty Stills."

- Open *Photoshop*.
- Open the still, the still is displayed.
- Double-click on the crop tool icon.
- A dialog box is displayed into which you can select the height and width of the image. Enter: 2.5, press Tab, enter 2.5 again, then click "OK."
- After the dialog box closes, crop a portion of the still that will be displayed on the person's card in the kiosk. Try to get all of the head and an even amount of background around the head. Don't worry about trying to get the size exactly to 2.5" x 2.5", because *Photoshop* will adjust whatever you have selected to that size.
- If the still looks good, save it and use the new code with a different number. In that way, the original still can be kept unchanged if it is needed for future use.
- If the still doesn't look good, repeat step above.
- Once you have cropped the stills so that they will fit the kiosk, you can go to the kiosk stack. Quit *Photoshop*.

How the Audio Was Captured. In order to digitize the audio segments for the faculty members, their videotape footage was needed, as was *HyperCard*. The equipment used were the VCR, a monitor, and the Quadra. The tape segment was played several times to make sure that the voice portions were accurate. *HyperCard* recording procedures were followed: Open the *HyperCard* audio palette and click the "edit" button to expand the palette. To begin recording, click the "record" button just before the video tape is started. Allow a few seconds for lag time because the audio palette is slower than the video. When enough voice has been recorded, click the "stop" button on the audio palette. Click the "play" button, to hear the audio that has been recorded. Edit the sound as needed in the sound window on the audio palette—select and delete what is undesirable. Click the "save" button. *HyperCard* will save the sound and create a button simultaneously. The sound buttons were then saved to a separate *HyperCard* stack for holding. When the Kiosk stack was put together, the sound buttons were copied from the holding stack to the individual faculty cards and were used for the "Hear Me...".

How the Data Were Put Together

The card in Figure 7 shows the format that was used for each of the faculty members' cards. Fields are used to display the name of the academic division, the faculty name and rank, and the navigation palette.

The navigation palette accesses the other academic division directories, the main directory, the previous and next cards, and the search text function (find). These are all buttons. When the "find" button is accessed the faculty name plate is hidden and the "search text" box is shown as in Figure 6. The "search text" is closed by clicking on the "done" button or by closing the card. The user can exit the kiosk by clicking on the "I'm Done" button, which is linked to the title card (see Figure 2).

The four buttons at the bottom of the individual faculty cards access text and audio data. The buttons "My Research," "Courses I Teach," and "Did You Know...?" each show a field in the left center area of the card. In Figure 7, the "Courses I Teach" field is shown. These fields are shown by clicking on the related buttons. These fields are hidden in either of three ways: clicking on the field itself, clicking on another data button, or going to another card. The "Hear Me..." button access the voice recording of the individual's self-introduction.

Script 2. Background Script for an Individual Faculty Card.

```
on closecard
      -- These instructions will close the infor-
      mation fields in case
      -- one is left open when the user accesses
      another card.
      hide bkgnd field "course"
      hide bkgnd field "about me"
      hide bkgnd fld "research"
      pass closecard
end closecard
```

Script 3. Displaying the Search Text Box

```
on mouseUp
      -- "Find... Button for Kiosk - Script --
      -- Bkgnd button
      -- Use this script for the search function.
      lock screen
      hide card field "name plate"
      -Shows a background field to mask the name
      plate.
      show background button "Search"
      show background button "Enter Search Text"
      show background button "Done"
      show background field SearchInfo
      unlock screen
end mouseUp
```

The individual faculty card script (see Script 1) lists the *HyperCard* instructions that are needed to display color and show the faculty pictures. The background script for this card (see Script 2) was used to close the hidden fields if left showing when the card was closed. Other Scripts are also provided.

Bugs and Caveats

If you intend to use color, the colorizing external commands (XCMDs) must be installed on each stack that is going to be made. Every copy of the kiosk stack must have the XCMDs installed individually. This can be done with either *HyperCard* version 2.2 or with the command Colorizing

Script 4. Searching for Text

```
on mouseUp
      -- "Search" button for kiosk - Script - EPC
      -- Background
      lock screen
      put background field "SearchInfo" into
      SearchString
      put empty into background field "SearchInfo"
      -- Go to next card so can "find again"
      push card
      go next card
      find string SearchString
      if the result is "not found" then
        beep
        beep
        pop card
      else
        put the foundField into fieldLoc
        show fieldLoc
        -- If SearchString is found, need to see
      which field it is in and if
        -- that is a hidden field, show the field
      end if
      unlock screen
      put SearchString into background field
      "SearchInfo"
```


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Script 5. Button Script for Displaying the Information Fields

```
on mouseUp
      -- This script is used to show the hidden "My
      Research" field.
      -- It was used for the other information
      fields as well.
      -- Remember to name the fields appropriately
      in this script.
      -- To use this script for one of the other
      hidden fields,
      -- the field names need to be added or
      deleted as necessary.
      colorizeHC "colorfill", "31,40,289,236",
      "48816,23337,65520"
      --Colors the area that is occupied by the
      information fields to make way for the
      -- display of the "research" field.
      hide bkgnd field "course"
      --Hides the "Courses I Teach" field in case
      it has been left open.
      hide bkgnd field "about me"
      --Hides the "About Me..." field in case it has
      been left open.
      colorizeHC "Erase", "31,40,289,236"
      --Erases the color from the space for the "My
      Research" field.
      show bkgnd fld "research"
end mouseUp
```

HyperCard by BungDabba. This stack is available from "Cool Mac Stacks" published by Hayden Press.

If the stack is closed while a picture is displayed, *HyperCard* will display a message, "No Such Window."

Technical Specifications

The program, *HyperCard* (version 2.1), was used in the development of the kiosk. Colorizing *HyperCard*, developed by BungDabba was the external command that allows *HyperCard* to display color. The video capture software used was *Screenplay* by Super Mac. The image touch-up software used was *Photoshop* and the video editing software used was *Premiere*, both by Adobe.

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Teaching Educators About Virtual Reality

Hilary McLellan

Introduction

This past spring semester I taught a graduate seminar on virtual reality and education. And, in May, I chaired a panel on virtual reality and education at the Meckler VR '94 Conference in San Jose, California, where I mentioned that I had taught this course. Since then, I have received a number of requests for information about how to teach an educational technology course about virtual reality. So I have prepared this article for others who wish to teach about virtual reality.

Virtual reality is a type of interactive computer-based application that provides a synthetic digital environment. Virtual reality evokes a feeling of immersion, a perceptual and psychological sense of being in the digital environment presented to the senses. Virtual reality represents the convergence of several disciplines, including human-computer interface design, simulation and data visualization, robotics, computer graphics, stereoscopy, and computer-aided design.

Virtual reality is a type of computer-based simulation. The simulation industry is virtual reality's primary precursor (in particular flight simulators). Virtual reality is a type of computer application for simulating environments, objects, actions, and processes. The technology of virtual reality lets you enter and interact with a world that is simulated more fully and convincingly than earlier types of simulations.

However, virtual reality is not just a simulation tool. It is a new type of human-computer interface that replaces traditional computer interface devices, such as keyboard and mouse, with devices that allow more intuitive interactions with data and involve our senses in new ways. Virtual reality is also a communication medium characterized by interaction and a sense of "presence." Virtual reality is a tool for problem solving and for visualizing and understanding data. Virtual reality provides a different way to see and experience information, one that is dynamic and immediate. Virtual reality is an artist's tool and a new artistic medium. It supports different modes of perception and perspective, emotion, and thought. Virtual reality provides a medium for expressing concepts that cannot be said in words or in pictures alone. The purpose of virtual reality is to create an experience that occurs in physical reality or perhaps only in the imagination, representing ideas so we can move through them and manipulate them in ways we cannot in physical reality.

Virtus Walkthrough Software

In describing my course, let me start by saying that I did not have access to expensive immersive virtual reality equipment. My students used the award-winning, low-cost desktop VR program *Virtus Walkthrough* (with the educator's discount, this program costs $240; a similar, but less sophisticated program, *Virtus VR* is available for about $100). With *Virtus Walkthrough*, it is possible to design and represent architectural spaces in 3-D on the Macintosh desktop (there's also an IBM version of *Virtus Walkthrough*). You can cut and paste furniture, windows, and other objects from a set of libraries that is enclosed. Or you can develop your own objects. You can also create a "guided tour" for people who explore the virtual world you have created—just click a button to start the tour—or they can explore it freely, using the mouse for navigation. This program is used by Steven Speilberg, James Cameron, and other Hollywood directors for planning movie sets. On high-tech movie sets, such as *The Abyss* (where *Virtus Walkthrough* was first developed), this planning tool has saved a lot of money.

Using *Virtus Walkthrough*, my students were assigned to develop a model of some type of small world: a neighborhood, a set design for a theatrical performance, an imaginary world, etc. The model was to include a guided tour feature or directed walkthrough. For these projects, students were required to prepare a brief report explaining the story behind each virtual world. My students created diverse projects. One, a middle school teacher, created a model of her ideal school. Another student created models of all the buildings at Fort Scott (barracks, officer quarters, hospital, etc.), an historic site on the Santa Fe Trail, together with an informational *HyperCard* stack. We encountered one problem with *Virtus Walkthrough*: very slow loading speed for files. However, David Smith, the founder of the Virtus Corporation, has told me that the latest version of *Virtus Walkthrough* loads files more quickly.

Course Goals and Objectives

The goals of this VR course were (a) to have students learn about virtual reality technologies, design issues, and applications, especially applications in education and training, and (b) to have students obtain hands-on experience designing non-immersive virtual reality architectural walkthroughs. The course objectives were as follows:

1. Students will learn the basic categories of virtual reality technology.
2. Students will learn about the historical development of virtual reality.
3. Students will learn about different theoretical foundations of virtual reality.
4. Students will learn about existing and potential virtual reality applications in education and training, including: (a) data gathering and visualization, (b) project planning and design, (c) the design of interactive training systems, (d) virtual field trips, and (e) the design of experiential learning environments.
5. Students will learn about the emerging virtual reality industry and technologies.
6. Students will develop virtual reality applications with the *Virtus Walkthrough* program.

VR Course Textbooks

The textbooks for this class were important for setting the direction of the course. They included:

Hamit, F. (1993). *Virtual reality and the exploration of cyberspace*. Carmel, IN: Sams. Paperback.

Laurel, B. (1991). *Computers as theatre*. Reading, MA: Addison Wesley. Paperback.

Woolley, B. (1992). *Virtual worlds*. Cambridge, MA: Blackwell.

Stephenson, N. (1991). *Snow crash*. New York: Bantam.

In addition to these texts, several articles were also assigned. These are listed in the resource section at the end of this article.

This may seem like a lot of textbooks, but keep in mind that the Stephenson book is a paperback science fiction novel. This book vividly describes a fictional virtual world called the Metaverse. Science fiction often provides a window to the future. Stephenson's depiction of this fictional virtual reality world highlights some important design issues. I assigned students to write a paper identifying VR design issues and discussing/critiquing them in the context of Stephenson's scenario and also in the context of the other readings. Students were asked to address the question: What are the implications of the issues Stephenson raises for the design of virtual reality systems for education and training? For a guide to this analysis, see McLellan (1994)—"Beam me up to my avatar." For example, in one scene of Stephenson's story, the main character Hiro Protagonist (or rather his virtual representation) must participate in a sword fight in the Metaverse. He wins the swordfight but, in the process, destroys the illusion of realism. What happens in virtual reality when there is a sword fight and someone's virtual legs are hacked off? This presents a design problem: it breaks the design metaphor. The virtual representation of the sword fighter is not acting like a real body—it's hollow inside like an inflatable doll—the computer hasn't rendered the interior. So this breaks the illusion of reality for everyone present in the virtual world. This may seem like an offbeat illustration, but the design problem is very real and has broad implications for VR *and* multimedia.

More and more science fiction and fiction novels explore the themes of virtual reality and virtuality versus realism, so there are additional resources for this kind of instructional activity—analyzing fictional scenarios of VR applications. Some examples of these books are Orson Scott Card's *Ender's Game*, Michael Crichton's *Disclosure*, and Ayodah Offit's *Virtual Love*. Then of course there is William Gibson's award-winning science fiction novel *Neuromancer*, which coined the term 'cyberspace' and had an immense impact on VR pioneers. Older examples of science fiction describing virtual reality type applications include Ray Bradbury's powerful story, "The Veldt" and Harry Harrison's story, "Ever Branching Tree." The TV show *Star Trek: The Next Generation* presents a compelling imaginary VR application—the Holodeck.

The book *Virtual reality and the Exploration of Cyberspace* by Francis Hamit provided an overview of the history of VR, industry players and entrepreneurs, and applications. It also includes some useful narratives or scenarios. There are several books that could have filled this need, but Hamit's overview of industry players and entrepreneurs stands out. This book provided the introductory text. It comes with some sample IBM VR software programs.

Woolley's book *Virtual Worlds*, provides an engaging discussion of the precursors to virtual reality and related trends that are emerging. This includes simulation, artificial intelligence, electronic communication, hypermedia, chaos theory, complexity theory, the world stock market, computer graphics, and computer viruses. This book presents some fascinating stories about these various developments and shows how everything is linked together. This book provides an important understanding of VR both in terms of historical trends and theoretical developments underlying contemporary technology, science, and human society.

Brenda Laurel's book *Computers as Theatre* is included because Laurel is an important theorist, researcher, and application developer on the scene today. Her ideas about dramatic theory as a design guide for interactive media are very important for multimedia, distance education, *and* virtual reality. The paperback edition of this book contains a chapter where Laurel reflects on how virtual reality R&D has evolved over the last few years from an obsessive concern with immersive technology (goggles and gloves) to a greater concern with telepresence—the experience of immersion, which engages design issues of greater concern to educators and educational technologists.

These four books provided the basis for the virtual reality course that I taught, providing coverage of history, practice, and theory. One book that came out while I was teaching this course may also be very valuable. Linda Jacobson's paperback book *Garage Virtual Reality* (1994) describes how to put together a low-cost "garage" or "home brew" virtual reality system and presents several case studies of people who have put together low-cost VR systems. For example, it is possible to get free software that has been developed at different universities. It is also possible to use the PowerGlove toy—now costing under $50—as an interface device. IBM is the best platform for developing a garage VR system, although resources are emerging for the Macintosh. For Amiga users, I recommend Haitex Resources of Charleston, South Carolina (803/881-7518) for-low cost VR software that can be used either immersively or non-immersively.

Course Topics

The topics for individual class sessions included the following:

- Introduction to virtual reality.
- The virtual reality industry.
- Virtual reality: Introduction to theoretical aspects & design issues.
- Introduction to virtual reality applications.
- Introduction to virtual reality applications in education.
- VR and education: Multiple intelligences, Constructivism, and Situated Learning.
- Introduction to Brenda Laurel's theoretical model.

In addition to these topics, students presented topics from Woolley's book and discussed the readings and related topics that emerged, such as the Internet (Cyberspace), Multi-User Dungeons (MUDs), and Multi-User Simulated Environments (MUSEs), such as Cyberion City, a MUSE based in Cambridge, Massachusetts, that was designed to promote constructivist learning. MUDs and MUSEs are text-based virtual worlds. Rheingold's book *Virtual Communities* (1994) provides a fascinating discussion of these phenomena. Since some of the students in my class were very familiar with these Internet resources, we had some wonderful discussions. Students presented their *Virtus* projects in class. I was amazed at the ingenuity of these designs. For example, one student, an elementary school teacher, led us through a virtual tour of the scenes in Little Red Riding Hood and the Big Bad Wolf.

Conclusion

This is a brief overview of the course on virtual reality and education that I developed and taught recently. It is interesting to note that two faculty members, a professor of architecture and a professor of dance sat in on my class and actively participated in discussions and other activities. Students represented diverse backgrounds—education, art, mass communication, and business—and formed an interdisciplinary group to examine a technology that bridges many disciplines and offers opportunities in many content areas. And over the past year, I have been advising the

International Centre for Scientific and Technical Information in Moscow, Russia, which is sponsoring a conference on Multimedia, Hypermedia, and Virtual Reality (MHVR) in September. The interest in VR is growing quickly. Children, in particular, are fascinated by virtual reality. Educators may want to become informed about this technology, which is closely linked to broad trends in society and technology.

Perhaps the information presented here will be useful to you. It is important to emphasize that there are many different types of virtual reality and a growing number of resources—books, videos, software, online discussions and applications. While much of the technology is incredibly expensive, there is some low cost software. And it is possible to put together your own immersive VR system for about $4,000.

Resources for Teaching about Virtual Reality

I. General Resources

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Brill, L. (1993). Metaphors for the traveling cybernaut. *Virtual Reality World, 1*(1), q-s.

Hamit, F. (1993). *Virtual reality and the exploration of cyberspace*. Carmel, IN: Sams.

Helsel, S. K., & Roth, J. (Eds.). (1991). *Virtual reality: Theory, practice, and promise*. Westport, CT: Meckler.

Jacobson, L. (1994). *Garage virtual reality*. Carmel, IN: Sams.

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Kreuger, M. (1991). *Artificial Reality II*. Reading, MA: Addison Wesley.

McLellan, H. (1992). *Virtual Reality: A Selected Bibliography*. Educational Technology Bibliography Series (Vol. 6). Englewood Cliffs, NJ: Educational Technology Publications. (ISBN 0-87778-246-6)

Pimentel, K., & Teixeira, K. (1992). *Virtual reality: Through the new looking glass*. New York: McGraw Hill.

Rheingold, H. (1991). *Virtual reality*. Reading, MA: Addison Wesley.

Rheingold, H. (1993). *The virtual community: Homesteading on the electronic frontier*. Reading, MA: Addison Wesley.

Wexelblat, A. (Ed.). *Virtual reality: Applications and explorations*. Boston: Academic Press Professional.

Woolley, B. (1992). *Virtual worlds: A journey in hype and hyperreality*. Oxford, England: Blackwell.

Schrage, M. (1991). *Shared minds: The new technologies of collaboration*. New York, NY: Random House.

II. Additional Readings from My Class

Kellogg, W.A., Carroll, J.M., and Richards, J.T. (1991). Making reality a cyberspace. In M. Benedikt (Ed.). *Cyberspace: First steps*. Cambridge, MA: MIT Press. 411-431.

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Merickel M.L. (1990, December). The creative technologies project: Will training in 2D/3D graphics enhance kids' cognitive skills? *T.H.E. Journal*, 55-58.

III. Additional Resources Concerning VR and Education

Bricken, M. (1991). *Virtual reality learning environments: Potentials and challenges*. Human Interface Technology Laboratory Technical Publication No. HITL-P-91-5. Seattle, WA: Human Interface Technology Laboratory.

Bricken, M., & Byrne, C.M., (1993). Summer students in virtual reality: A pilot study on educational applications of virtual reality technology. In Alan Wexelblat (Ed.). *Virtual reality: Applications and explorations*. Boston, MA: Academic Press Professional. 199-218.

Bricken, W. (1990). *Learning in Virtual Reality* (HITL Memo No. M-90-5). Seattle, WA: Human Interface Technology Laboratory.

EDS (1991). *EDS: Bringing JASON's vision home*. Dallas, TX: Author.

Helsel, S.K. (1992). Virtual reality as a learning medium. *Instructional Delivery Systems, 6*(4), 4-5.

McLellan, H. (1994). Avatars, affordances, and interfaces: Virtual reality tools for learning. In R.A. Braden, D.G. Beauchamp, & J. Baca (Eds.), *Visual Literacy in the Digital Age*. Blackburg, VA: International Visual Literacy Association.

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Merickel M. L. (1991). *A study of the relationship between perceived realism and the ability of children to create, manipulate, and utilize mental images in solving problems*. Oregon State University. Unpublished doctoral dissertation.

Moshell, J. M., & Dunn-Roberts, R. (1993). Virtual environments: Research in North America. In: Thompson, J. (Ed.). *Virtual reality: An international directory of research projects*. Westport, CT: Meckler. 3-26.

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Moshell, J.M., & Hughes, C.E. (1994b, February). *The virtual academy: Networked simulation and the future of education*. Proceedings of the IMAGINA Conference. Monte Carlo, Monaco. 6-18.

Regian, J.W., Shebilske, W.L., & Monk, J.M. (1992). Virtual reality: An instructional medium for visual-spatial tasks. *Journal of Communication, 42*(4), 136-149.

Thurman, R.A., & Mattoon, J.S. (In press). Virtual reality: Toward fundamental improvements in simulation-based training. *Educational Technology*.

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Wickens, C.D., & Baker, P. (1994, February). *Cognitive issues in virtual reality*. Human Perception and Performance Technical Report UIUC-BI-HPP-94-02. The Beckman Institute, University of Illinois at Urbana-Champaign, Urbana, IL. To appear in W. Barfield and T. Furness (Eds.) (In press). *Virtual reality*. Oxford: Oxford Press.

IV. Science Fiction VR Resources

Bradbury, R. (1951). The Veldt. In *Illustrated Man*. New York, NY: Doubleday.

Card, O.S. (1984). *Ender's Game*. New York: Bantam Books.

Gibson, W. (1986). *Neuromancer*. New York: Bantam Books.

Harrison, Harry (1972). Ever Branching Tree. In Cheetham, Anthony (Ed.), *Science Against Man*. New York: Avon.

Stephenson, N. (1992). *Snow crash*. New York: Bantam Books.

V. VR Video Resources

Video programs concerning virtual reality are available from Media Magic (415-662-2426) and from Mecklermedia (203-454-5840). The Association for Computing Machinery (ACM) sells a set of two videos entitled "HDTV and the Quest for Virtual Reality." EDS has a promotional video concerning The Jason Project. Other low cost VR resources such as the Stereo Mac 3-D program with shutter glasses (goggles) are available from 3-D TV of San Rafael, California.

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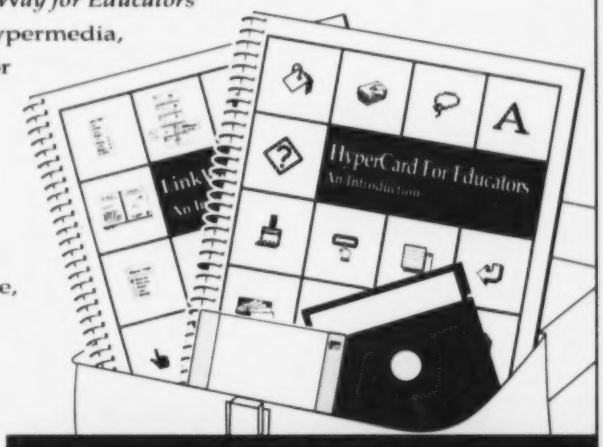

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In the Classroom I

Jordy Whitmer

The Annotated Field Trip: A Multimedia Project For The Primary Grades

Introduction

Teaching primary students how to create multimedia projects is a formidable but far from impossible task that proves challenging and stimulating to students and teachers. Some teachers introduce their students to the paint tools first. By focusing on one of the many skills necessary for multimedia, students are less likely to be overwhelmed. As students become ready and intrigued, teachers can assign projects that require additional skills. An alternative to starting with the paint tool skills is to use template stacks. Again, students focus on a limited number of skills and need not concern themselves with the entire process of multimedia stack creation. The Annotated Field Trip is an example of how templates can be used.

Project Plan

Objectives:

- Students will experience a field trip (or any similar event related to the curriculum).
- Students will be informally introduced to the concepts of cards, buttons, and text fields.
- Students will have a writing experience based in multimedia.
- Students will informally work on writing and discussion skills as they interact with their partners.
- Students will appreciate the potential of multimedia for other projects.

Materials:

- Multimedia authoring software (*HyperStudio*).
- Annotated field trip template stack (See Figure 1) created by the teacher.

Optional

- Computer connected to a VCR and monitor.
- Device for recording students voice onto videotape.

Procedure:

- Photograph scenes during a class field trip—it is better if students take the pictures.
- Scan photographs (or have them developed on a photo CD).
- Template creation by the teacher (See sample card below).

Lesson

- Demonstrate opening the template stack.
- Browse through the template stack with the class.
- Explain the procedures for selecting pictures (delete unwanted cards) and annotating.
- Pairs of students move to a computer and work together on one stack.
- Share student-generated text to give others alternative ideas.
- Pairs present their completed stacks.
- Optional—Videotape students' stacks while recording them reading the text. These can be taken home and shared.

Results

This Annotated Field Trip, simple in design, proves complex in effect. It is an excellent and motivational starting point for second and third graders. The students feel highly successful in annotating their template stacks. Because the students experience the event, writing ideas seems to come easily and provoke highly animated discussions. The student pairs jointly construct their text after discussing ideas and taking turns at the keyboard. The student not typing helps compose or offers editing suggestions. Ideas, grammar, and spelling are revised as they work. Many pairs reread their work countless times, and have yet to tire of seeing themselves on the computer screen or videotape.

Other Ideas

This simple project stimulates new ideas. The third graders have moved on to creating stacks from scratch; the second graders are beginning to as well. One student's project seems to be an outgrowth of his experience with the Annotated Field Trip. He is working on a multimedia welcome center for the classroom that combines photographs and annotations of the school and classroom. Other teachers in the building are now working on similar projects, too. One first grade teacher is creating on a classroom "yearbook." Her class is annotating photographs from throughout the year. Another class has just begun a school history which will combine the fourth graders' research with old and new photographs.

Cautions & Advice

- Photo CDs take one to two weeks to develop. A Xapshot type of camera would have been faster for development.
- Fewer pictures are better. Many pairs of students' text became repetitive on later cards.
- These students used invented spelling easily. For those classrooms where students get bogged down with spelling, typing, etc., an alternative would be to construct the text as a whole class. This suggestion also works well for those with access to only one machine.

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In the Classroom II

Annette Lamb

QuickTake for QuickFun! Practical Applications of QuickTake Pictures

Apple's *QuickTake* 100 camera is a great addition for anyone creating multimedia projects. It's a lightweight, hand-held digital camera that allows you to take colo r pictures without using film. You can easily import your pictures directly into either a Macintosh or *Windows*-based computer. Because it only weighs a pound with batteries installed, it's easy to carry around. The built-in electronic flash makes the camera practical for both indoor and outdoor photography. Although it works best at 5 to 15 feet, the camera has automatic focus from 4 feet to infinity. With most digital cameras in the $1000 to $1500 range, the *QuickTake* camera is a relatively inexpensive alternative at $655.

The *QuickTake* 100 takes high-quality 24-bit color images. It supports PICT, QuickTime, TIFF, and *QuickTake* file formats for the Macintosh and BMP, PCX, JPEG, TIFF, GIF, and *QuickTake* file formats for *Windows*.

The digital camera can take up to 32 (320x240 pixels) standard resolution or 8 (640x480 pixels) high resolution pictures at a time. You can mix the types of pictures you take. For example, you could take 4 high resolution and 16 standard resolution pictures. They are stored in the camera until they are erased.

Taking Pictures with the *QuickTake* 100

Taking, importing, and manipulating pictures is easy with the *QuickTake 100* digital camera. The basic steps are outlined below.

To take a picture:

- Turn on the camera by sliding open the lens cover.
- Take a picture by clicking on the button on the top of the camera.

The pictures are imported through a high-speed serial connection. The cable comes with the camera and is connected to the modem port on a Macintosh. You need to install the *QuickTake* software on your computer in order to import and manipulate images. The software includes a control panel, *QuickTake* Setup, that creates a connection between the camera and the computer. You'll want to load the software on all the computers you'll be using even if you won't be importing images. As with *QuickTime* movies, some utilities are required when using *QuickTake* images.

To hook the camera to the computer:

- Turn off the camera by closing the door.
- Plug the serial cable into the modem port.
- Plug the other end of the cable into the side of the camera.
- Turn on the camera.

To connect the camera:

- Pull down the Apple menu and select Control Panel.
- Double-click the *QuickTake* SetUp Icon.
- Click on Connect to Camera.
- Close the *QuickTake* SetUp.

To transfer the pictures to your hard drive:

- Double-click on the camera icon.
- Drag the pictures from the camera to the hard drive.

QuickTake Pictures and the QuickTake Application

You can paste pictures directly into *HyperStudio* or other applications. Or, you can view the pictures using the *QuickTake* application. The *QuickTake* application software is great for viewing "thumbnails," deleting, cropping, rotating, and resizing images. However, you'll need more than 4MB to use the *QuickTake* application with System 7.

To view pictures:

- Double-click the *QuickTake* application.
- Pull down the File menu and select Open.
- Click on the picture you want.

QuickTake and HyperStudio

It's simple to open *QuickTake* pictures in applications software. Let's open a picture in *HyperStudio* for the Macintosh.

To import a picture into *HyperStudio* (See Figure 1):

- Pull down the Objects menu and select Add a Graphic Item...
- Double-click on the file you want.
- Use the selection tool to choose the part of the picture you want.
- Click OK.
- Drag and place the picture on the screen.
- Click outside the picture to place it.
- Click on the color of the frame you want.
- Click the up arrow to create a thick line around the picture.
- Click OK.

QuickTake and ClarisWorks

You can import *QuickTake* pictures into most popular applications. For example, you can incorporate pictures into any of your *ClarisWorks* documents.

To import a picture into *ClarisWorks* (See Figure 2):

- Open a new or existing document.
- Pull down the File menu and select Insert....

Ideas for Still Digital Pictures

There are endless uses for digitized pictures. A few ideas are provided to get you started thinking about classroom applications. Figure 3 shows a *HyperStudio* project about water.

Portfolios. It's hard to incorporate 3-dimensional products into a student's portfolio. With the *QuickTake* camera you can take pictures of models, dioramas, displays, and mobiles, and then paste them into a word processing package or hypermedia stack. Students can then describe their project and print out a black-and-white or full-color paper copy.

Before/After Projects. Students often participate in projects that show changes over time. For example, your students might work on a community clean-up project. Before and after pictures could be taken showing the positive impact of the clean-up project.

Seasonal Projects. Record the changing seasons with the *QuickTake* camera. Go on-location to a local river or nature area and take pictures during four different parts of the year highlighting the changing vegetation and wildlife. Add these changes to a class stack that is built throughout the year.

Growth Projects. How many times have you seen those Dixie Cups with beans growing on the window sill? You can add fun to this project, by having students take pictures of their projects each day as they grow.

Sequence Projects. Students often need to demonstrate the steps in a process. Students could then create games asking students to arrange the pictures in the correct order on paper or within a hypermedia stack.

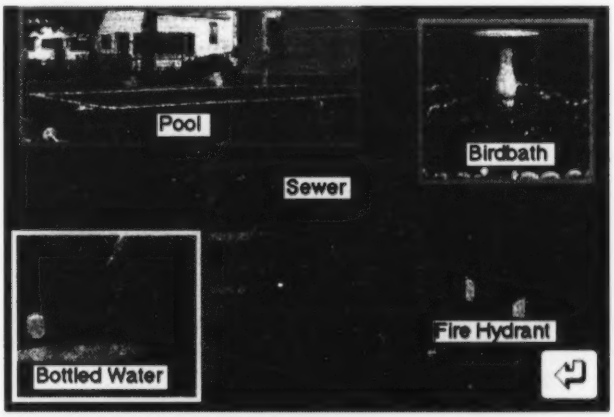
Correct/Incorrect Projects. Physical education teachers are always looking for ways to incorporate technology into their classes. Have students take pictures of correct and incorrect methods for particular physical activities such as holding a softball bat or golf club, starting a dance, or shooting a basketball. Students could incorporate these into their own procedures manuals.

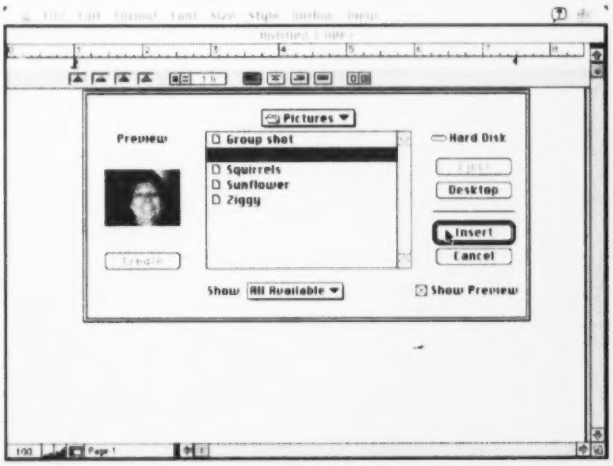
Illustrate Reports. Use the *QuickTake* camera to illustrate multimedia reports. For example, a report on recycling could be brought to life with pictures of items that can and can't be recycled. A multimedia project on architecture would be much more meaningful with photographs of homes in the community representing various styles.

Creative Writing Projects. "Pictures can speak a thousand words," and are great for story starters. Ask students to take pictures of various places and objects. Then have them write stories about the place or object. Or, take pictures of students showing various emotions and use those as story starters.

What's Next? Projects. Use pictures as starting points for group discussions, interactive multimedia stories, or consequences activities. For example, the first card could show a beer can sitting in the seat of a car. Ask students to write about the consequences on the second card. Or, take pictures of incorrect procedures and ask students to discuss what might happen as a result.

Community Map Projects. Create maps of the community and include photographs of important landmarks and buildings.





Figures 1-4. Figure 1 (upper left) shows the procedure for importing QuickTake *photos into* HyperStudio; *Figure 2 (upper right) shows the procedure for importing the photos into* ClarisWorks; *Figure 3 (lower left) shows a* HyperStudio *project in progress featuring* QuickTake *photos; and Figure 4 (lower right) shows an example of a student photo taken using QuickTake.*

Math Projects. Take a series of pictures and create real-world math problems.

Careers Projects. Ask students to spend a day with an adult in a career of interest. Take pictures throughout the day and ask students to create a stack titled: A Day in the Life of an Architect, Baker, or Lawyer.

Illustration Projects. Ask students to illustrate their favorite book with pictures they take with the *QuickTake* camera. How do they visualize the setting? Who do the characters look like? It's fun to compare student's ideas of what book characters and settings would look like.

Picture Background Projects. Use *QuickTake* pictures as backgrounds for writing projects. For example, a wooded landscape might be a nice background for a poem. A wall of graffiti would work for an article about the inner city.

Modified Picture Projects. Consider pasting *QuickTake* pictures into a paint program and modifying it. Students could create interesting abstract self-portraits using this technique.

Audio/Tutorial Projects. Create and narrate a series of pictures in a hypermedia stack. If hypermedia tools aren't available, ask students to create an audio tape to go with their pictures.

CD/Picture Projects. Add a CD music background to a series of *QuickTake* slides pasted into a hypermedia program.

Illustrate It Projects. Rather than just asking students to write about something, ask them to take pictures of it. For example, they could take pictures of the proper hand motions for bike safety.

A Dozen Ideas for Making It Work

Here are a dozen tips I've learned using the camera with both children and teachers. Hopefully, they'll make your first *QuickTake* experience successful.

1. Make sure the camera is pointed the right direction. I had a group of teachers accidentally take 32 pictures of their own face. They wondered why the flash kept going off in their face.
2. Discourage pictures of large spaces, such as the sky, woods, or fields. Leaves will look like ants and airplanes will be impossible to see.
3. The best pictures are taken at 4 to 14 feet from the object. Unlike other kinds of photography, it's best to fill the frame with the object. Remember, unless you're using the high resolution option, your picture is going to be small. The more small objects in the picture, the worse it gets.
4. Select objects with lots of color and contrast. The *QuickTake* camera is great with bright colors such as red, green, yellow, and blue. *QuickTake* pictures turn out best in bright light. In other words, daytime will be better than nighttime and outdoors better than indoors.
5. If you're going to do a lot of on-location work, make sure you take a PowerBook along. Because the *QuickTake* 100 doesn't have a disk system like the Xapshot, you'll have to download the camera after 32 shots. It doesn't take long for a group of fourth graders to fill the camera.
6. Take along backup batteries. The 3 NiCad rechargeable batteries last a long time, but will probably give out about the time you have the perfect shot. Remember, you can always use a PowerBook AC Adapter if your batteries quit.
7. Remind users to double check that the pictures have been downloaded onto the hard drive before erasing the camera.
8. Ask students to keep a log of their pictures. Otherwise they will have to look through each picture or identify them from the previews.
9. Immediately after downloading pictures, create a folder for the students and rename their pictures. You may choose to name the pictures based on the students' log using Kathy1, Kathy2, or KS.Sunflower, KS.Squirrel. Remember that two students could both have Sunflower pictures, so keep the folders separate and individualize the file names with student initials.
10. Send students out in small groups of four. Let each student take eight pictures. Come back and download all the pictures. Then give each student a disk with all the pictures. It's much faster than downloading eight at a time.
11. When printing your pictures on a black and white laser printer, check the Print menu. The pictures will turn out much better when the printer is set for Color/Grayscale if that option is available.
12. The *QuickTake* camera takes great "group shots." The Timer button gives you 10 seconds to get everyone in place before taking a picture (See Figure 4).

Conclusion

The key to a successful *QuickTake* experience is experimentation. You don't have to worry about the cost of film and you can always "trash" your mistakes, so go out and have fun!

Annette Lamb *is an associate professor in the Department of Teacher Education at the University of Southern Indiana, 8600 University Blvd, Evansville, IN 47712, 812/465-7148. E-mail: aclamb.ucs@smtp.usi.edu.*

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Internet Impact

Paola Williams

Internet Impact is the name of our new column on the internet and how it affects multimedia/hypermedia. Because hypermedia and telecommunications are inseparable, we feel that an informative column that can introduce our readers to the capabilities of the Internet and how virtual space and multimedia are incorporated would be helpful and relevant. If you have ideas and interesting tidbits to contribute, please send them my way via E-mail to pwilliam@uhunix.uhcc.hawaii.edu. I will try to include as many as possible in each issue. Let us know how we can best serve you and your interests....

An interesting note in a local journal out of Hawaii talks about the internet and connecting to the future. Some statistics: You can dial to any of 90,000 or more computers, send E-mail to any of 25 million people, and access hundreds of free, informative services. Industry experts project the rate of new users gaining access to the Internet each month at 20 to 30 percent.

A great quote from President Clinton and Vice President Gore: "As we move into the 21st century, we must have a government that can show the way and lead by example. We eagerly anticipate the day when electronic mail from the public is an integral and normal part of the White House communications system... As we work to reinvent government and streamline our processes, ...E-mail... can help to put us on the leading edge of process."

Who's Online at ISTE?

General Correspondence:

Internet: iste@oregon.uoregon.edu
CompuServe: 70014,2117
America Online: ISTE
Applelink: ISTE

Forums & Archives:

- Applelink (In K-12 Educational Resources-Associations).
- America Online FORUM on Technology in Education & Training.
- Internet Gopher: iste-gopher.uoregon.edu.

More ISTE Online Information

- Internet LISTSERVs.
- SIG/Telecommunications: SIGTEL-L@unmvma.unm.edu. Moderator: Kathy Kothmann, kathyk@tenet.edu
- SIG/Teacher Educators: SIGTE-L@nevada.edu. Moderator: Neal Strudler, strudler@nevada.edu
- Organization Affiliates: ISTEOA@cue.bc.ca. Moderator: Jim Swanson, jswanson@cin.etc.bc.ca
- ISTE Online. Editor: Talbot-Bielefeldt@ccmail.uoregon.edu.

What can you get out of the Internet?

The prospects for educators are unlimited. Here are a few examples:

- Jobs available worldwide
- Teacher collegiality
- Conference Information
- Technology Plans
- Maps
- Current Events
- Kid projects
- Degree programs
- Lesson plans
- Shareware software
- Hardware/Software solutions
- Partnerships & Collaborations

What are some Internet Sources?

This list could go on forever, if you have something to add or an example of one of the above send it to me and I'll include it next time!

The following books can help you learn more about the Internet and how it can impact your teaching and learning:

Estrada, Susan. *Connecting to the Internet*. O'Reilly & Assoc.

Tennant, Roy, Ober, John, & Lipow, Anne. *Crossing the Internet threshold: An instructional handbook*. Library Solutions Press, 510-841-2626.

LaQuay, Tracy & Ryer, Jeanne. *The Internet companion, a beginner's guide to global networking*. addison-wesley.

Kehoe, Brendan. *Zen and the art of Internet*. Prentice Hall.

Levine, John. *The Internet for dummies*. IDG Books, 800-762-2974.

Krol, Ed. *The whole Internet user's guide and catalog*. O'Reilly & Assoc. Second Edition (Great Section on Mosaic!) 800-998-9938.

Dern, Daniel. *The Internet guide for new users*. McGraw-Hill, 212-512-2000.

Harris, Judi. *Way of the ferret—Finding educational resources on the Internet*. ISTE Publications, 800/336-5191.

What's Hot?

Expo-Internet Art Gallery. The world's most accessible art gallery has opened on the Internet. Up since the end of March, Kaleidospace Media makes it possible for any of the 20 million users on the Internet to browse the work of aspiring artists.

Artists need not be Internet users to get on the system. They need only bring in images or samples of their art, which could include paintings, videos, sculpture, literature, poetry, or music, and Kaleidoscope will put the information into its online gallery. In addition to their art, participants are encouraged to submit photos of themselves, biographical information, past and future exhibits or installations, press clippings, and other information. The key to Kaleidospace's presence on the Internet is new software, NCSA Mosaic, part of World Wide Web. The software provides a graphical interface for the Internet, permitting the display of graphic images on Windows PCs, Macintoshes, and Unix terminals. The software became available last fall. The WWW may be the Internet's 1-2-3. Its fusion of multimedia and hypertext serves as a model that other services will strive to match.

For more information about Kaleidospace you may gopher: gopher.kspace.com or ftp: ftp.kspace.com. General E-mail: editors@kspace.com. The Web Site: http://kspace.com

THE RUSH IS ON!

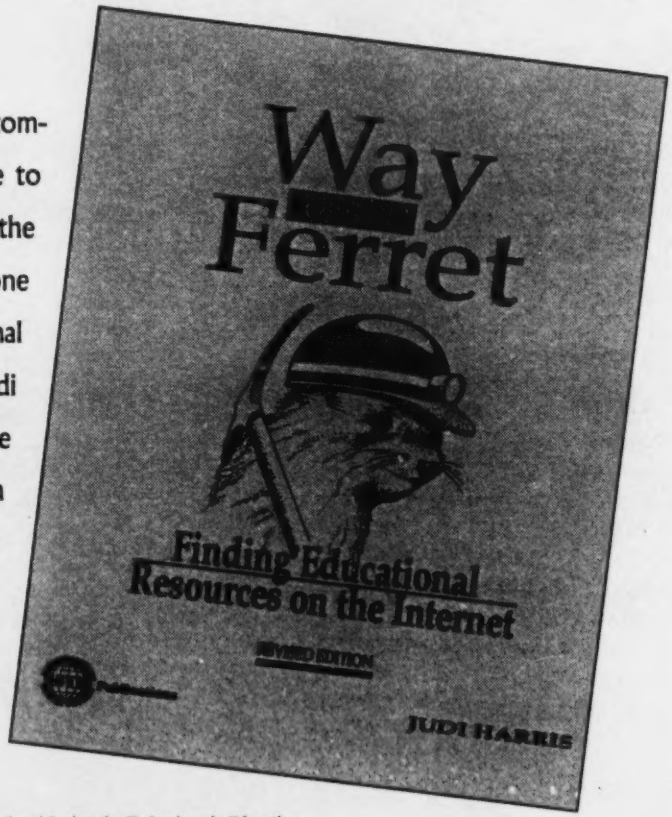
Today, the mother lode of knowledge is the "network of networks," the Internet.

In Way of the Ferret—Finding Educational Resources on the Internet, network explorer and guide Judi Harris shows you how to ferret out the information you need—original source documents, free and inexpensive software, up-to-the-minute news and discussions, cooperative classroom projects, and invaluable personal contacts.

Learn to use information mining tools, including Telnet, FTP, and Gopher. Reach out to colleagues and remote classrooms through E-mail, listservs, and newsgroups.

More than a technical manual on telecommunications, Way of the Ferret is a guide to practical classroom and personal use of the Internet, presented with skill and humor by one of the most active authors in educational technology. Way of the Ferret is based on Judi Harris' "Mining the Internet" column in The Computing Teacher journal, with information updated to stay current with the constantly evolving Internet environment.

Order your copy of Way of the Ferret, and stake your claim to the information gold mine.



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The phrase "mining the Internet" was borrowed with permission from Computing Services personnel at the University of California, Davis.

HyperExchange

Call for Help

I'm working on a project involving Assessment in Multimedia Classrooms. How are you handling assessment in your K-12 or higher education classroom? What kinds of multimedia assignments are you giving students? How are you grading projects? Are you using quizzes, tests, checklists, rubrics, or just "winging it"?

I'm looking for sample assignments, assessments, and multimedia projects. Please send me examples of what you're doing. I'll share my results in a future issue of HyperNEXUS! Send disk or print copies to the address below.

Announcement

If you'd like to see your hardware or software announced, please send me a press release. If you have information about the features of software updates or other information you think might be useful for readers, let me know. If you're working on a project and need assistance, let me know and I'll post your request!

Send Me Your Projects

Because we're having trouble getting articles, we're considering an issue devoted to all kinds of projects developed by educators, developers, graduate students, and K-12 students. You don't have to do any writing. Simply send me a disk with your project. I'll make the screen dumps. All you have to do is tell me what you've sent me. We're looking for all levels of projects, from beginning to advanced. Any format will do!

Annette Lamb, University of Southern Indiana, Dept. of Teacher Education FA144, 8600 University Blvd., Evansville, IN 47712.

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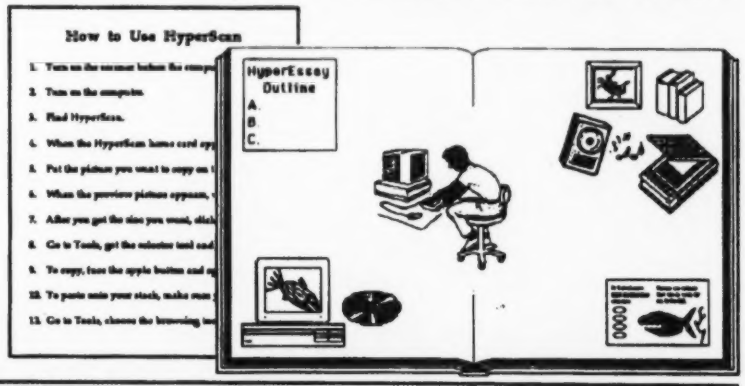

This book is a teacher's guide to creating classroom multimedia compositions with HyperCard. It provides blackline masters with step by step instructions to get writers to use the Macintosh computer, HyperCard software and laserdisc technology to create compositions incorporating drawings, photos, sounds (including music), visual effects and even film clips. Written by Mark Rogers. Book is 8 1/2"x11"

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Cheat Sheet

Kevin Benson

Beginning *HyperCard*: Creating an Interactive Quiz for the Classroom

There are many aspects of *HyperCard* that a teacher can use in the classroom. One feature that can be useful at many different grade levels from elementary to high school is that of an interactive quiz. Recently, I created a quiz for my record-keeping class using *HyperCard*, and found that a number of students enjoyed it. A quiz of this nature is an excellent change of pace and a good way to review material covered in class. This quiz is designed for immediate and private feedback for the student.

Creating a Quiz, Step-By-Step

Once you try this, you will no doubt find a use for this type of activity in your classroom. To get started, follow the instructions outlined below. Eventually you will need to supply your own questions, but for the first time through follow the sample.

1. Open *HyperCard*. I used Version 2.0 for this example.
2. Create a New Stack by pulling down the File Menu. Give your stack a name and click on New.
3. Add a title to the first card using the tools in the toolbox. This may be done by pulling down the Tools Menu and selecting the Text Tool, which is the large A in the lower left corner. Type in the title "Sample Quiz." By tearing off the Tool Box and double clicking on the "A" you can change the size and font of the type used for the title. Clip art may added at this time if desired. You will need to supply the art work for the stack yourself.
4. When you are finished typing your title, go back to the Tools Menu and select the small hand in the upper left corner, commonly called the Browse Tool. Now add a New Button to your stack by pulling down the Objects Menu and selecting New Button. Move the button to the lower right corner of the screen.
5. Double click on the button and a box will appear allowing you to name the button. Name it Question One. Now click on the Script button in the lower left corner. A screen should appear that says script of card button id 1-"Question One" at the top.
6. Now type in the sample script exactly as it is written. Note: Scripts are very particular about things like spaces, periods, quotation marks and so on. Pay particular attention to every detail when creating or copying scripts. Double check your typing for even the smallest error.

```
on mouseUp
    —This script will have a question appear on the screen and the
    —user will then select an appropriate response. A reaction will occur
    —based on this response, indicating if the answer chosen was correct
    —or incorrect. The response will remain on the screen for 3 seconds.
    —Below is the question followed by the choices. (Three choices max.)
answer "1. In 1849 there were still 15 million buffalo seen on "&¬
"the Plains. By what year was the southern herd exterminated?
    "&¬
" a.1870 b.1880 c.1890." with "a." or "b." or "c."
    —The part below is the script that will indicate if the answer
    —chosen was correct or incorrect.
set visible of card field "Reinforcement" to true
if it is "a."
then select line 3 in card field "Reinforcement"
if it is "b."
then select line 1 in card field "Reinforcement"
if it is "c."
then select line 3 in card field "Reinforcement"
wait 3 seconds
select line 6 in card field "Reinforcement"
set visible of card field "Reinforcement" to false
end mouseUp
```

7. When you have finished typing the script you can exit this area by clicking the small white box in the upper left corner of the screen.
8. Now create a New Field by pulling down the Objects Menu and clicking on New Field. A rectangle will appear on the screen. Double click on this rectangle and another larger rectangle will appear on the screen. At the top will be a space where you can type in a Field Name. Type in the word "Reinforcement." Click on the Scrolling item under the Style Heading. Then click OK at the bottom of the screen.
9. Shape the new field, by holding the mouse down on the corner of the rectangle and stretching it so it is long and

narrow-(about 1/2" high by 4" wide just so it is large enough to show one long line of type). Move the cursor so it is in the middle of the field, press the mouse button down, and move this field to the bottom of the screen. When you have the field in the desired position, click the mouse outside the field.

10. Pull down the Tools Menu and select the Browse Tool, which is the little hand in the upper left corner of the tools menu.
11. Go down to the field you have just created and click in this field. Type the following words. Excellent! The answer you have chosen is correct. Then hit the return key twice and type these words. Sorry, incorrect. Try again.
12. Now go back to the Tools Menu and select the Field Tool, which is the item in the far right corner of the top row. Move the mouse back to the field you have created and double click on it. A rectangle will appear—go to the left side and select Lock Text. Click the OK button at the bottom of this screen to exit.
13. Your one-point interactive quiz is now completed. Select the Browse Tool from the Tools Menu. Click on the Question One button and make a choice. You should see the question "What year did Leif Ericsson first contact Native Americans on the North American mainland? a. 945 b. 1007 c. 1167." followed by three buttons with the choices a. b. and c. Click on the answer you feel is correct. If you selected "a" or "c" you have made an incorrect selection and the words: "Sorry, incorrect. Try again." should appear. If you selected "b" the words "Excellent! The answer you chose is correct." should appear.
14. If the question does not appear after you have clicked on the button, then an error has probably been made typing the script or you haven't chosen the Browse Tool from the Tools Menu. Select the Browse Tool from the Tools Menu and try again. If the question doesn't appear now, you will probably see something like "Can't understand... your script." You will have a choice of going to the Script or Cancel. Select Script and check the script you copied for possible errors. The cursor will go to the line where the error is located to help you find the mistake. Another way to access the script is to select the Button Tool from the Tools Menu and then double click on the button "Question One." You will then select the Script button from lower left corner of the screen.
15. After editing your script and closing the script screen, you will be asked if you want to save the changes made to your button, click Yes.
16. If your quiz still doesn't work, try to find that old buddy of yours that knows something about *HyperCard*. You also could try to do some troubleshooting yourself.

Helpful Hints

1. On your script you will notice the — at the beginning of the sample script. This makes the words following the — inactive and are called Comments. These Comments explain what is happening in the following script.
2. You begin entering your question with the word answer followed by the question itself in quotation marks. If your question is more than one line long you will need to end the line with a space "&¬. The ¬ is made by holding down the option and return key. This will allow you to continue on the next line which will be started with " (quotation marks).
3. When you enter the answer choices begin this portion using the word with followed by each answer choice in quotation marks with the word or between the choices. For example: with "a," "b," or "c."
4. Avoid starting a line with the word "with" or the answer choices.
5. If the proper response is not highlighted you may need to change the line of the field you have selected. For example if you pressed the return key three times, the second line of feedback would be in line 4 instead of 3. When you write your own quiz I would suggest a line reinforcing the correct answer to appear highlighted if the correct answer was chosen and a highlighted line indicating that the incorrect answer was chosen if the incorrect answer was chosen. This will give the user immediate feedback.
6. An alternative to selecting a specific line of the reinforcement field is to select a specific string of characters. For example, select char 46 to 79 in card field "Reinforcement."
7. Line 6 is selected at the end of the script so that the field appears empty when it is first visible to the student.

Good luck in your creation of interactive quizzes and review sessions!

Kevin Benson *is a Computer Studies/Business teacher at the Flandreau Indian High School located in Flandreau, South Dakota.*

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HyperNexus: Journal of Hypermedia and Multimedia Studies is the journal for the SIG. Published quarterly, *HyperNexus* brings together new ideas, new ways of thinking, and prominent voices in the area.

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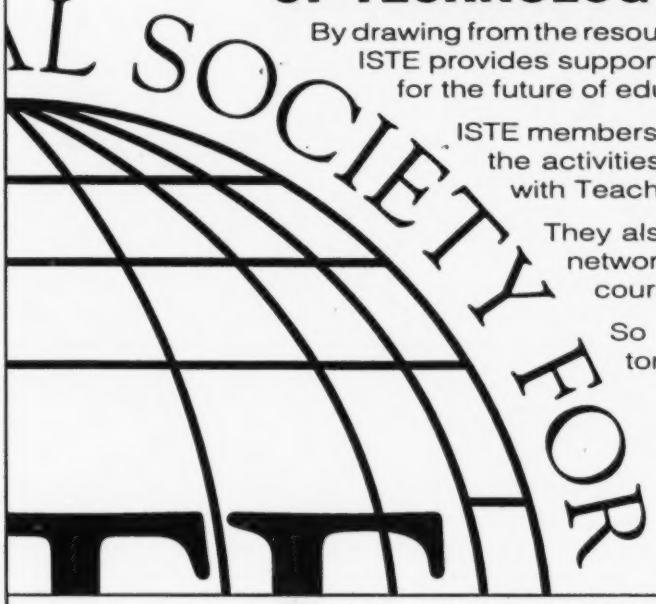

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